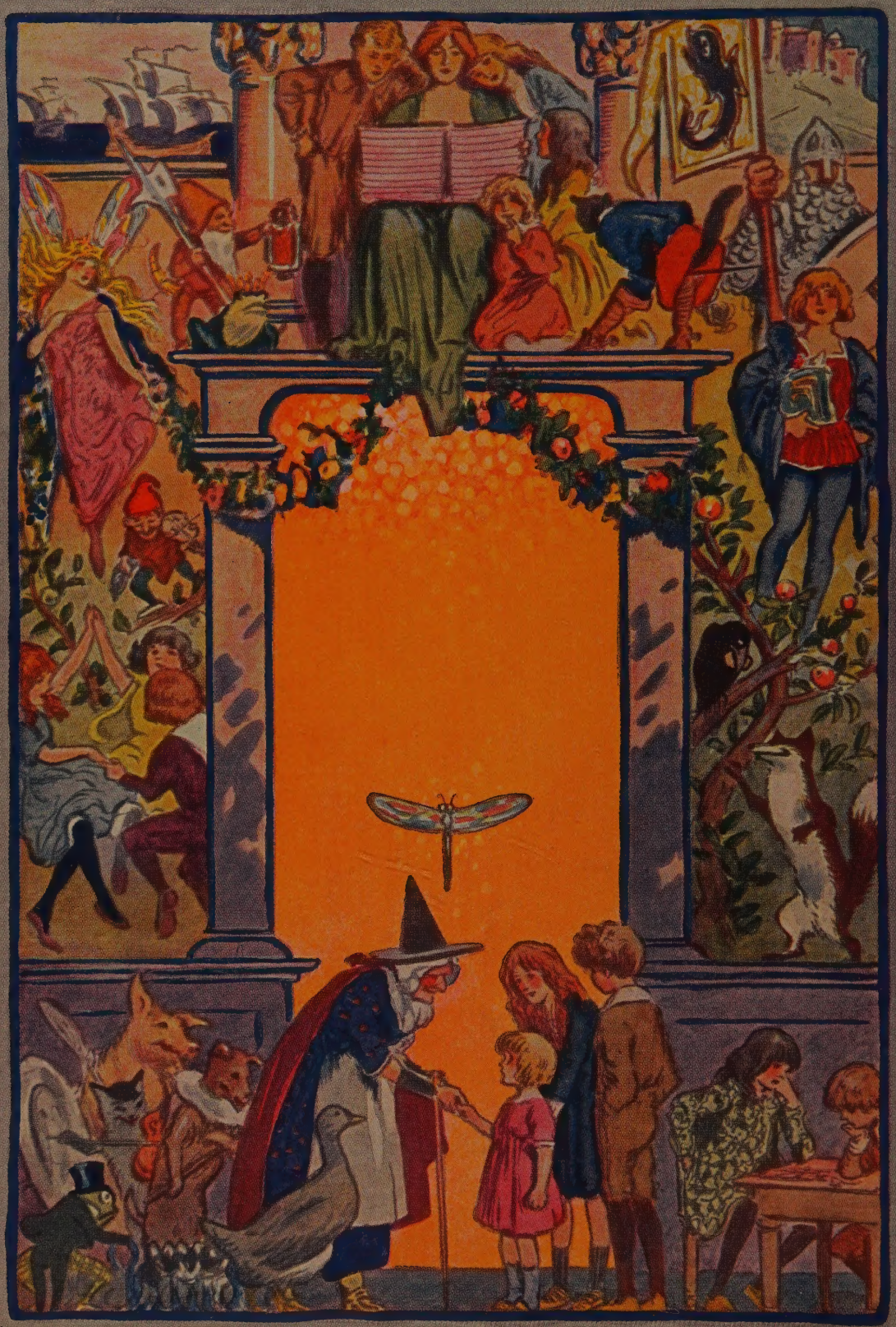


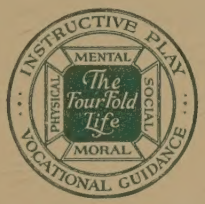
SCIENCE
ART

There was a quaint dainty queen
Who once made a quilt for a dean,
With some quadruple tweeds,
Quite a number of beads,
And a queer little quill in between.

The HOME UNIVERSITY BOOKSHELF

PREPARED UNDER THE SUPERVISION OF

THE EDITORIAL BOARD *of the* UNIVERSITY SOCIETY



VOLUME VI

THINGS TO MAKE AND THINGS TO DO

THE UNIVERSITY SOCIETY
INCORPORATED
New York

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In addition to its wealth of new material THE HOME UNIVERSITY BOOKSHELF combines the very best features of its highly successful predecessors: namely, Boys and Girls Bookshelf, copyright 1912, 1915, 1920; Young Folks Treasury, copyright 1909, 1917, 1919; Father and Son Library, copyright 1921; Modern Boy Activity, copyright 1921, 1923; The Mother's Book, copyright 1919; The Child Welfare Manual, copyright 1916; The Home Kindergarten Manual, copyright 1921; and Bible Stories and Character Building, copyright 1915.

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INTRODUCTION

MERELY to glance through this volume makes one's fingers itch to "get busy"—even grown-up fingers. For what is more fascinating than making things for oneself? "Things to Make and Things to Do" answers the universal cry of childhood: "Mother, what can I do next?"

The normal child is a busy, restless little creature. He or she goes from one thing to another, spurred on partly by curiosity, partly by a desire to experiment or to try new powers. The mischief-making proclivities of active children are nothing more nor less than these natural traits turned or allowed to drift into wrong channels.

How much better is it, therefore, to exercise a wise supervision over the child's pastimes, directing the busy fingers and the eager mind into occupations worthwhile! Many valuable hints may thus be obtained as to his natural bent or future occupation. Who knows how many famous architects, or engineers, or painters, or musicians, or dressmakers, or milliners, or cooks, have been discovered in the nursery!

First let us take Drawing. The guiding of young fingers over simple designs brings into play a dozen different faculties—imitation, perseverance, neatness, imagination, a sense of form and color, and pride in accomplishment, among others. The training of the hand, eye, and co-ordinated muscles will be of great service later in ordinary penmanship and draftsmanship, even if the boy or girl does not evince special aptitude for art work. It is undoubtedly true that thousands of us grown-ups who shake our heads and say "I cannot draw," would have been able to do so surprisingly well, if trained in childhood.

The "Drawings Made Easy," by Cobb Shinn, speak for themselves. They begin with the simplest designs and gradually become more difficult as the child acquires proficiency. Starting from the easiest outline, such as a circle or an oval, the artist shows how by a few deft lines they can be transformed into a rabbit or a frog. By means of more complete diagrams, flowers and other pretty things follow, until a small balanced composition is achieved. This leads up naturally to the next subject, "Picture Making," in which the child is given his first lessons in color, design, and drawing when associated in a complete picture. Hugo Froehlich and Bonnie E. Snow, who present this subject, were pioneers in teaching, lecturing, and writing on industrial art, and

were distinguished for their practical and modern ideas and their ability to convey them in simple terms.

In this section we also have a chapter on "Modeling Small Sculptures in White Soap." Doesn't that sound alluring, especially for the youngster who is passing the mud-pie stage?

Other inventive children like paper cut-outs. In the section devoted to "Paper Craft" and in later hints on gift-making, there will be abundant material to interest them.

"Self-Directed Work and Play," by several specialists, tells the little folks how to make a lot of fascinating things, such as scrap-books, boats of pea-pods or walnut shells, corn-cob houses and dolls, clothes-pin people, spool castles and furniture, paper lanterns, and what not—fifty full pages of suggestions with drawings. What an endless amount of royal fun is in this section alone! Rainy days or convalescent days will mean nothing but joy-times!

Turning on through the pages one will note "Shadow Pictures," with full hints for making these droll images on the wall; cross-word puzzles; pictures that have something wrong with them, for the clever youngster to discover (this teaches observation and attention to details); handwork for the holidays, such as Hallowe'en, Christmas, and St. Valentine's Day; handicraft for girls; basketry; woodwork; and even simple experiments in chemistry, electricity, and mechanics.

Cooking is delightfully taught in a series of twelve lessons, which are really conversations between a mother and her small daughter. The daughter, whose head does not come much higher than the kitchen table, when she first begins to inquire into the mysteries of the kitchen, asks her mother questions, and as she is answered, she learns the use of the various utensils and how to mix and cook things. It is chatty, informal, and thoroughly delightful—as good as a story-book. This section is by Grace Barden Carleton.

In similar easy and graphic style, first lessons in needlework are taught in "The Little Mother's Work-Basket." The little girl wants to dress her doll and is shown the mysteries of easy cut-outs and stitching. Gradually the lessons become more advanced, but by such easy stages that the small miss is a clever seamstress before she knows it—and without its ever being a chore, as in the old days when little girls were set wearily down to a "stint."

In a word, this helpful and suggestive volume has been carefully planned so that it will overlook nothing in the way of each child's potentialities. Beginning with the most rudimentary lessons, it gradually expands to take in the widest variety of tastes, as the youngsters themselves begin to exhibit certain proclivities. Further, it encourages them to be resourceful, independent, and to have their good times at home.

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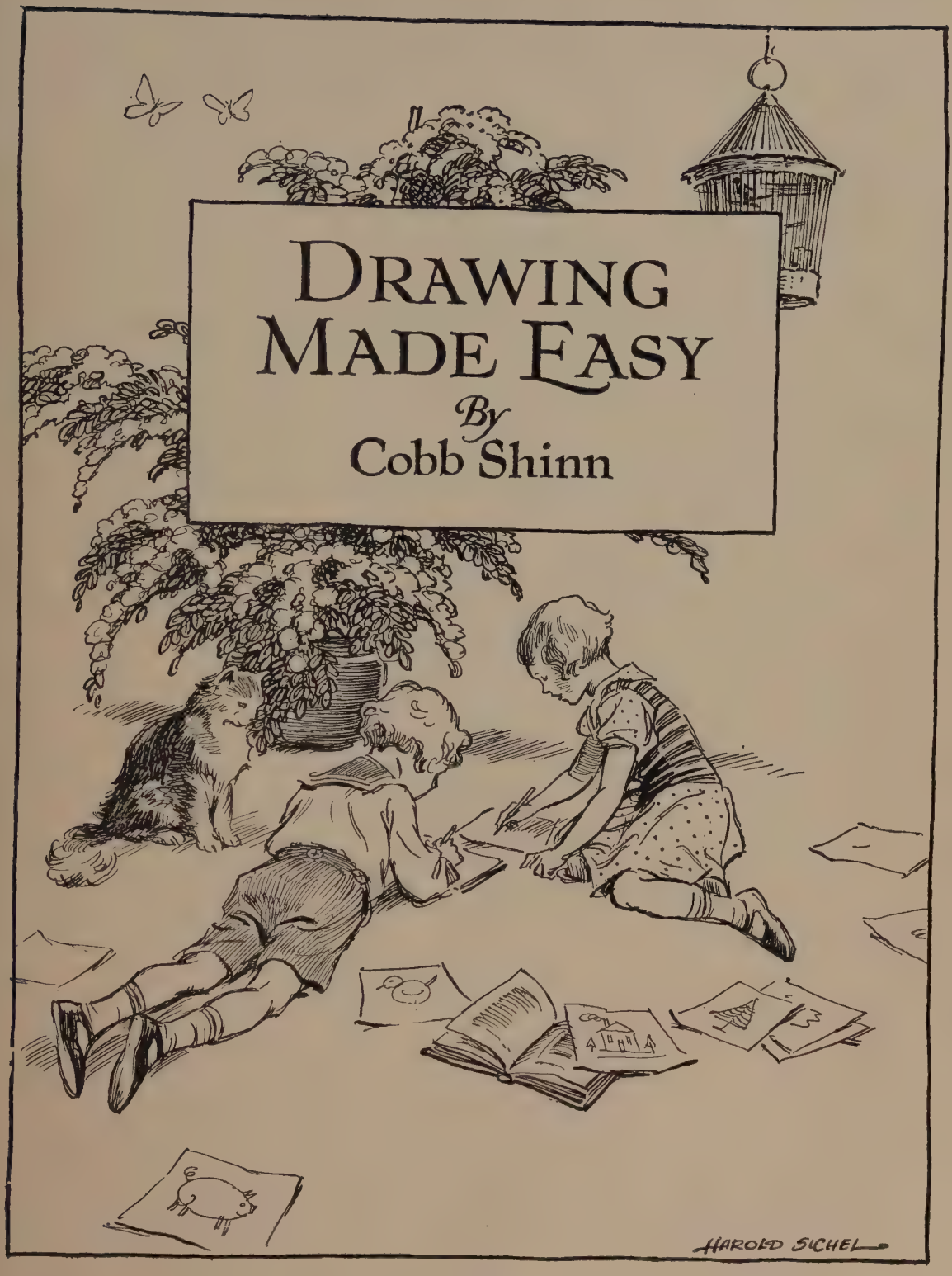

DRAWING
MADE EASY
By
Cobb Shinn
HAROLD SICHEL

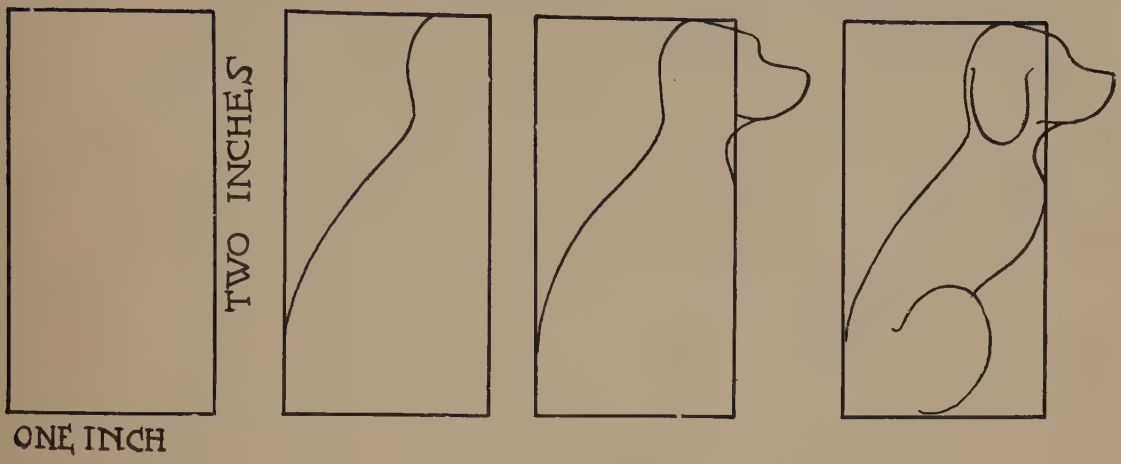
DID you ever make a picture of a horse and have someone say: "That's a fine dog." We know how disappointed you felt, because we have had exactly that experience.

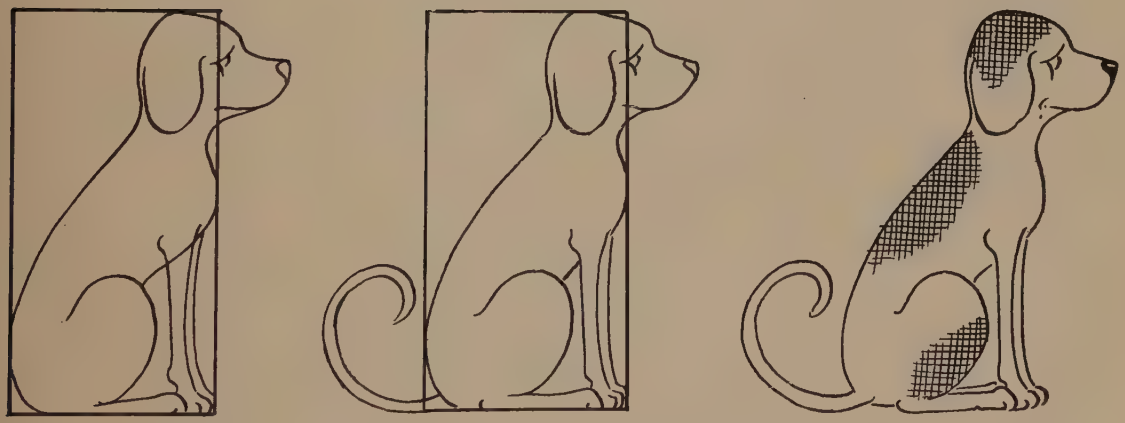
In the following pages Mr. Shinn shows us how to avoid such disappointments. Try his plan. You will be surprised how easy it is to get pleasing results.

Make your first pencil marks very light so that it will be easy to erase the lines you do not want in the finished picture.

You do not need to have your drawings always in pencil. They can be colored with crayons or water colors, and made very attractive.

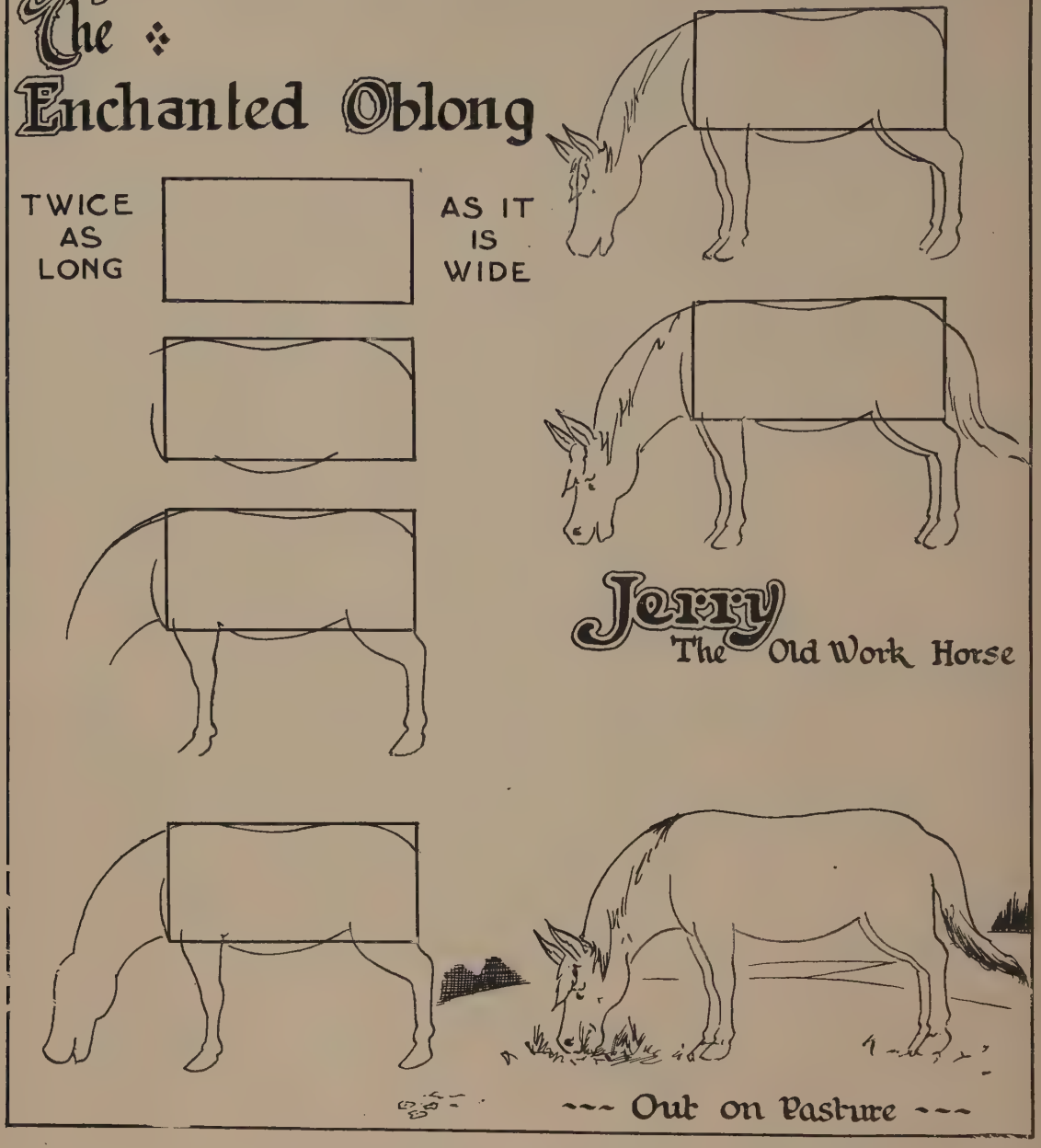
The Magic Oblong



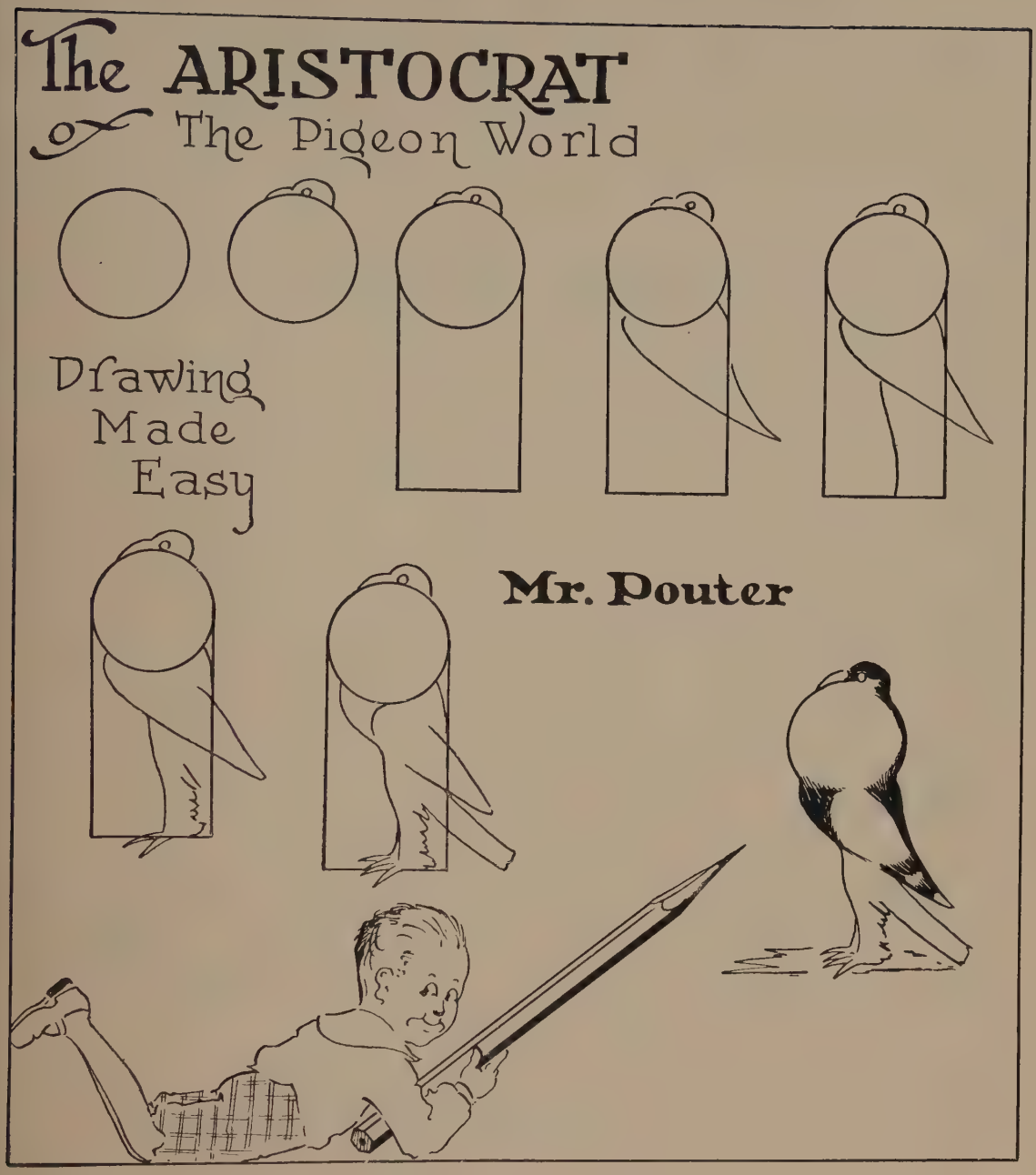


Without the oblong you would find it a very hard matter to get the curved lines just where they should be. With its aid, however, you cannot fail to place them properly. Now get your pencil, paper and ruler and try to make this picture of a dog.

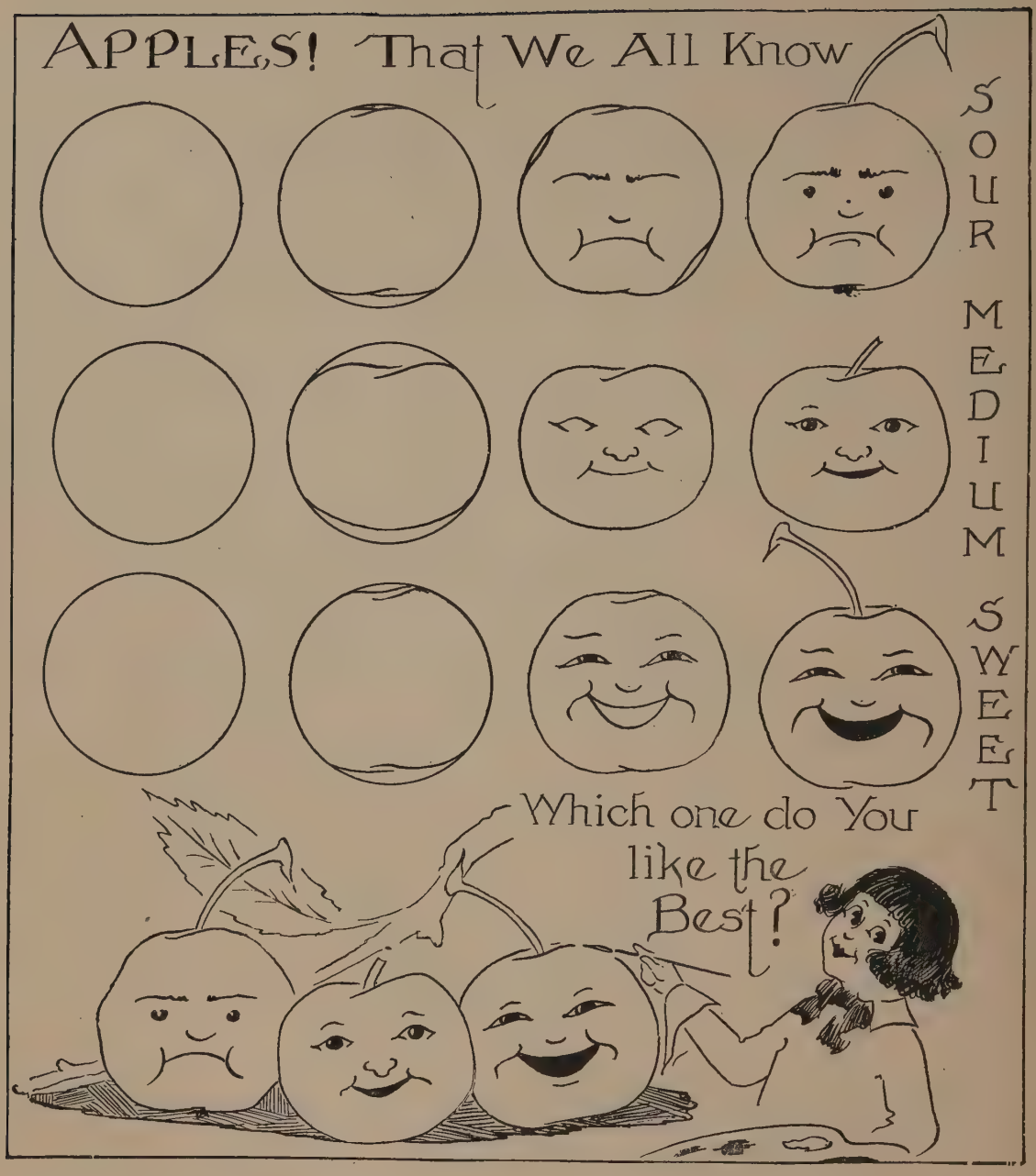
The Enchanted Oblong



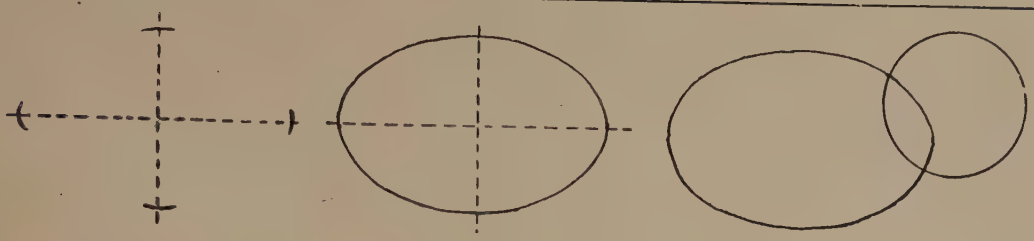
I don't mind telling you that a horse is a very hard animal to draw. Yet, by using this oblong you can do away with most of your trouble. Try using it and you will find that you can make a better picture of a horse than you have ever been able to draw before.



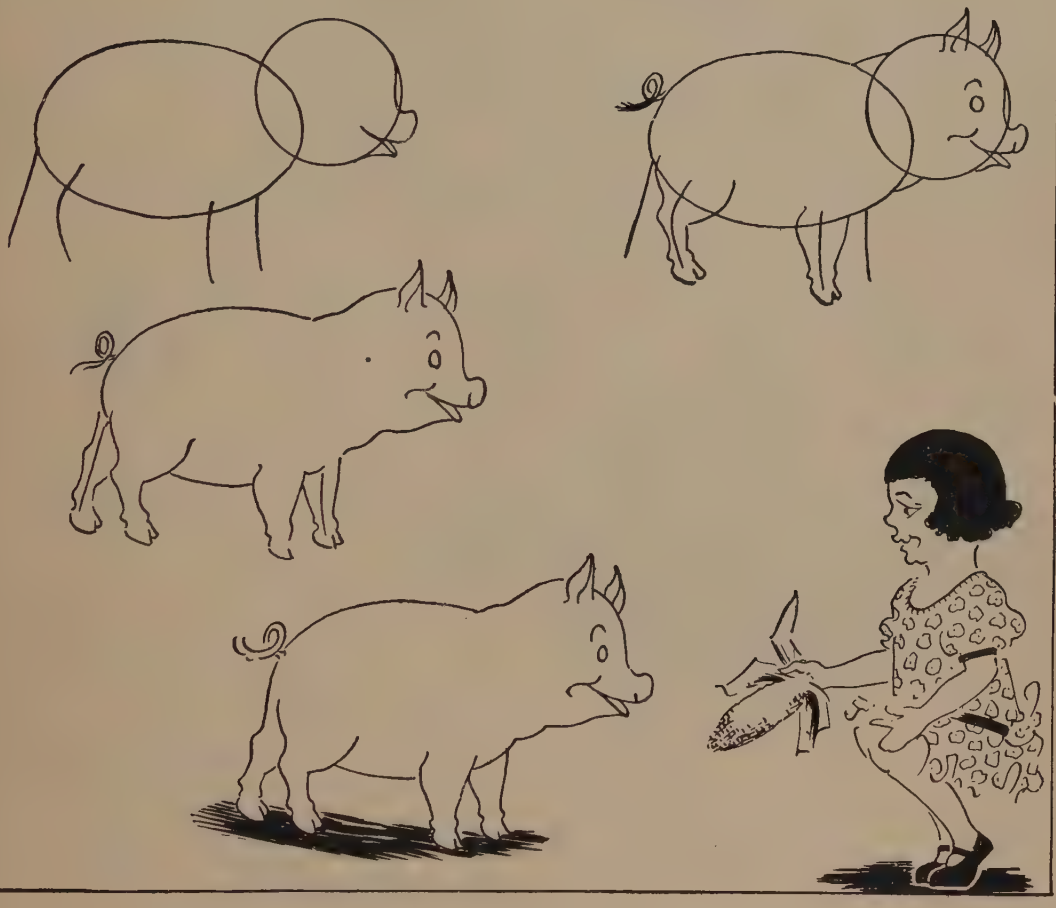
In starting with a circle and an oblong, you have the secret of drawing the "Aristocrat of the Pigeon World." Just try it, and before you have your drawing half finished, you will find that we are right.



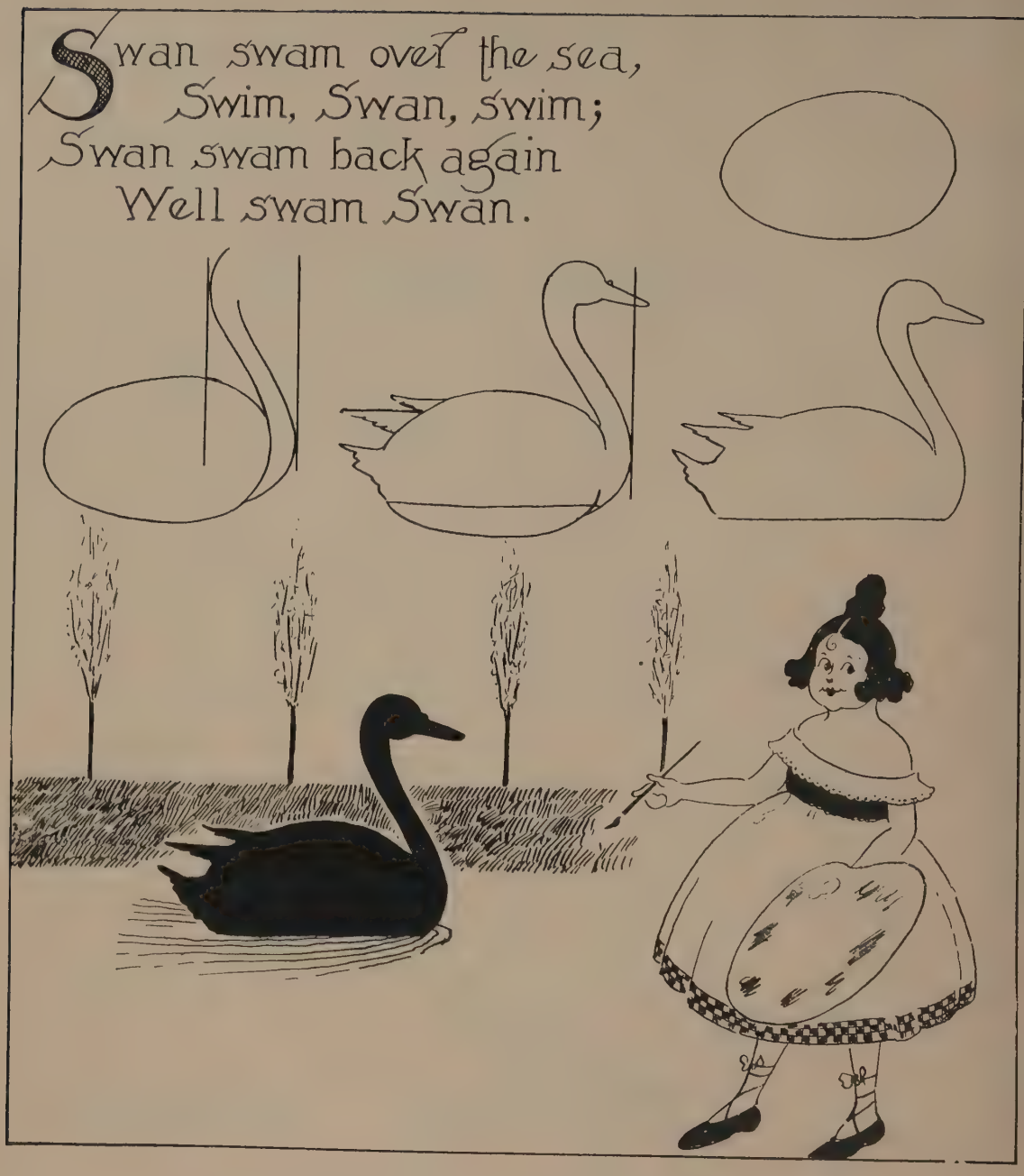
Here is a way to make some studies in expression: First making circles, then turning the circles into apples. By adding just a few simple lines you can make faces on them. It is strange how just a few simple lines will change the expression of a face, isn't it?



PIGGY WIGGY



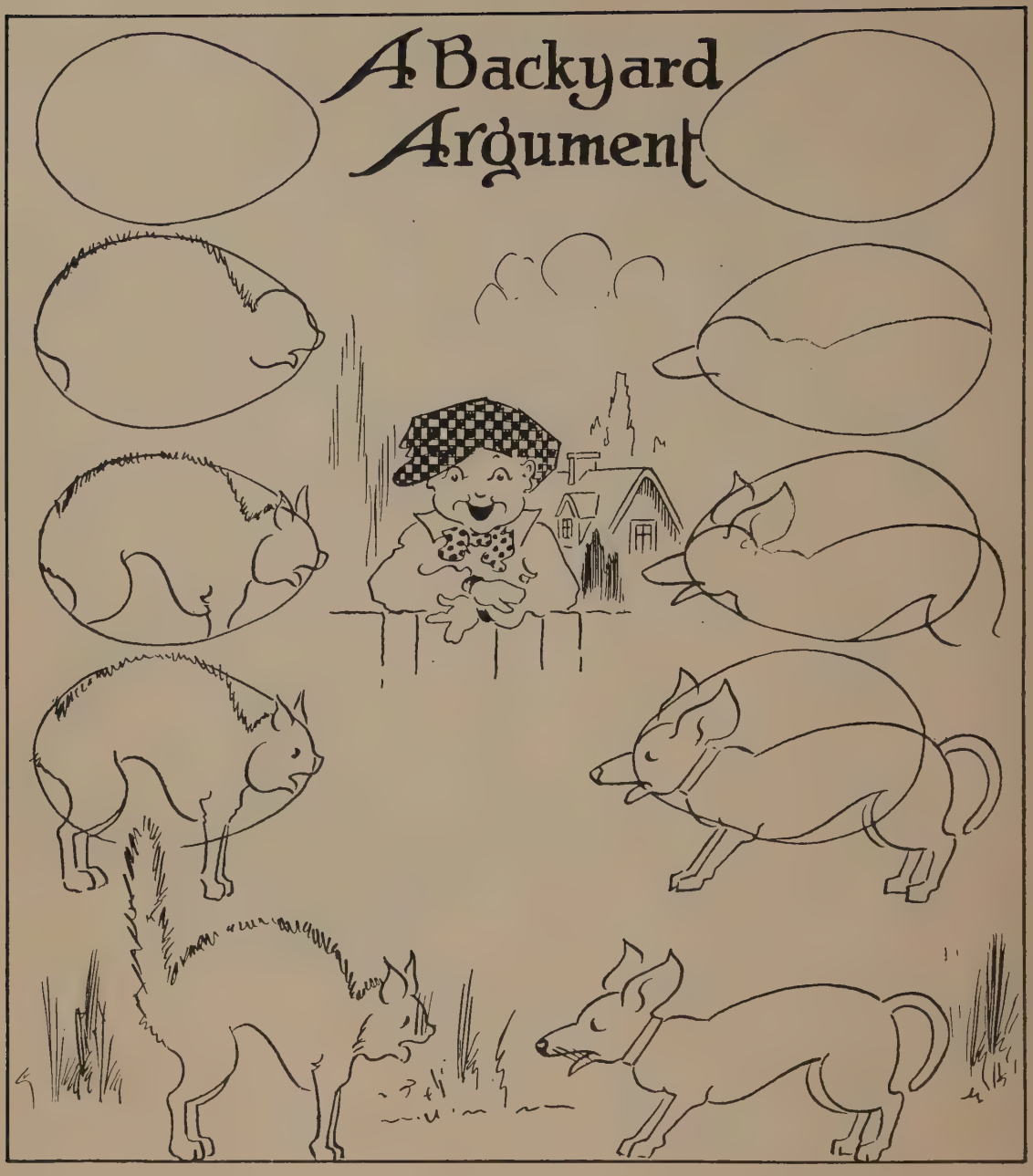
One of the first things you'll say is, "I can never draw an oval." Now, we have shown you an easy way to do it. The first illustration solves that little mystery. The circle you can make with a compass. The rest is very easy. Now is the time for you to get busy and try it.



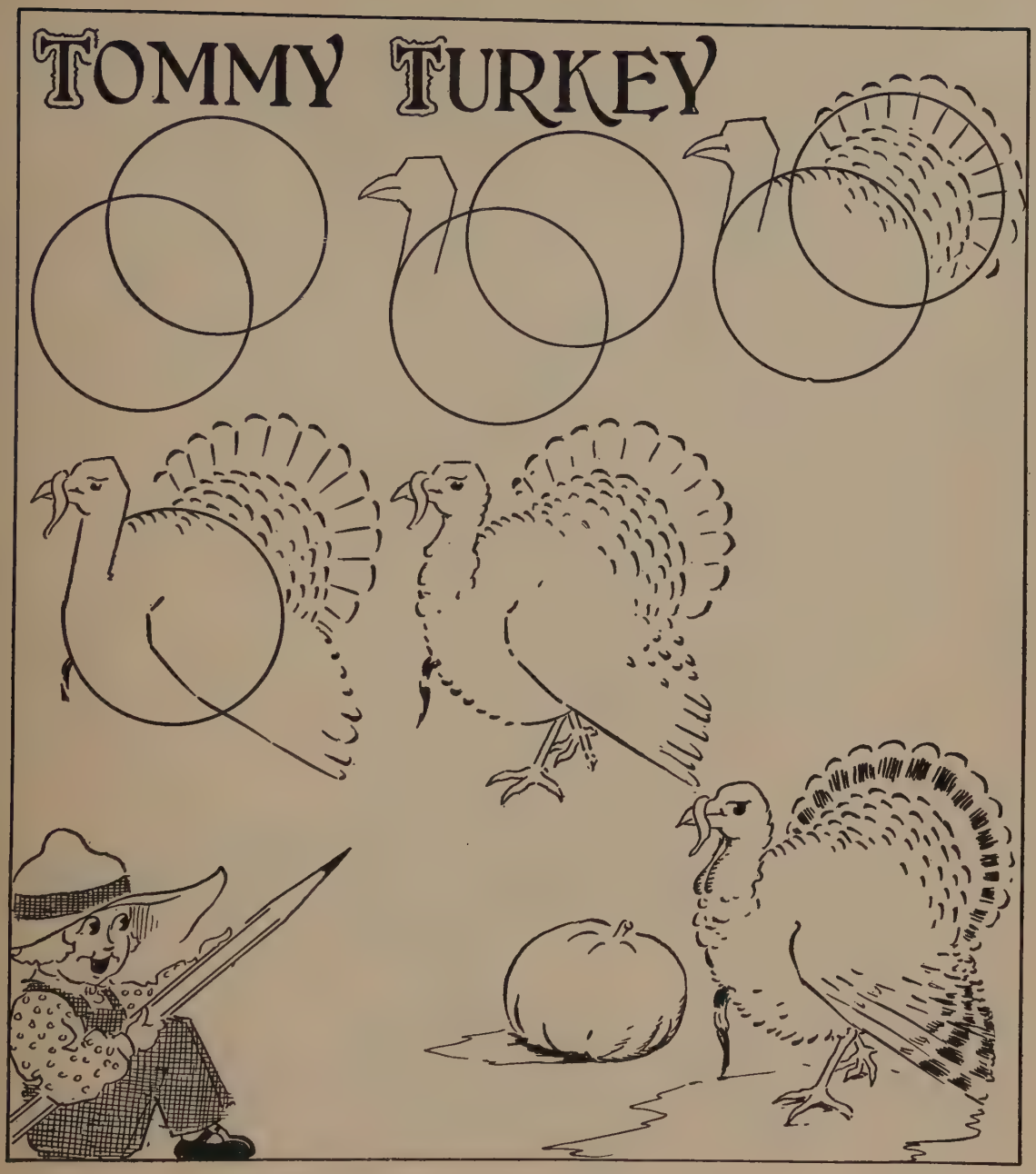
Don't you think that this Swan makes a rather attractive picture? Did you notice how easy it is to draw when first you start with an egg? Find your pencil and paper and show Father and Mother that you can draw pictures like those in the newspapers.

That makes the Baby Chick Easy to Draw.

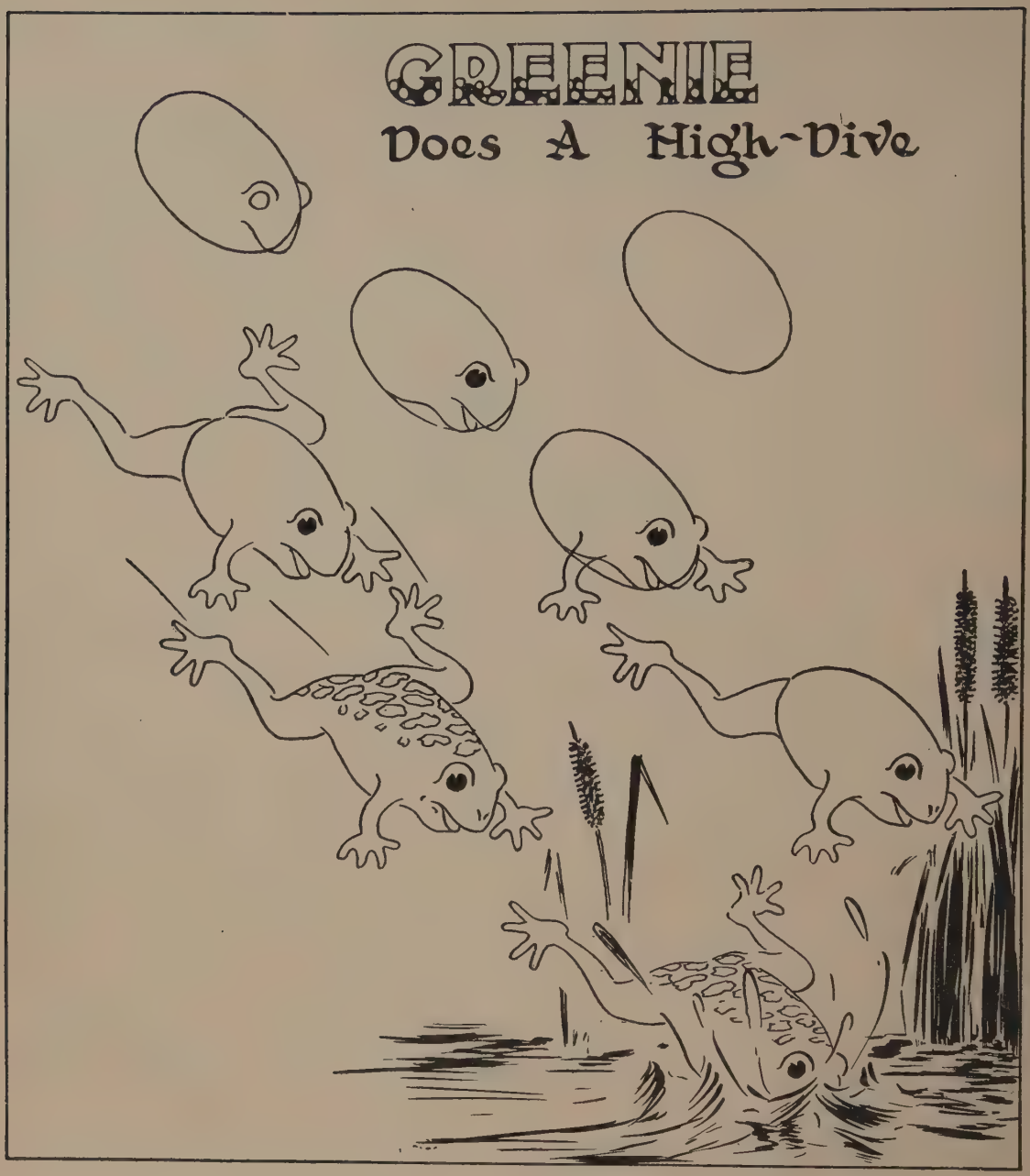
An oval makes the drawing of the little chick so very easy to do. Just try and you will see for yourself.



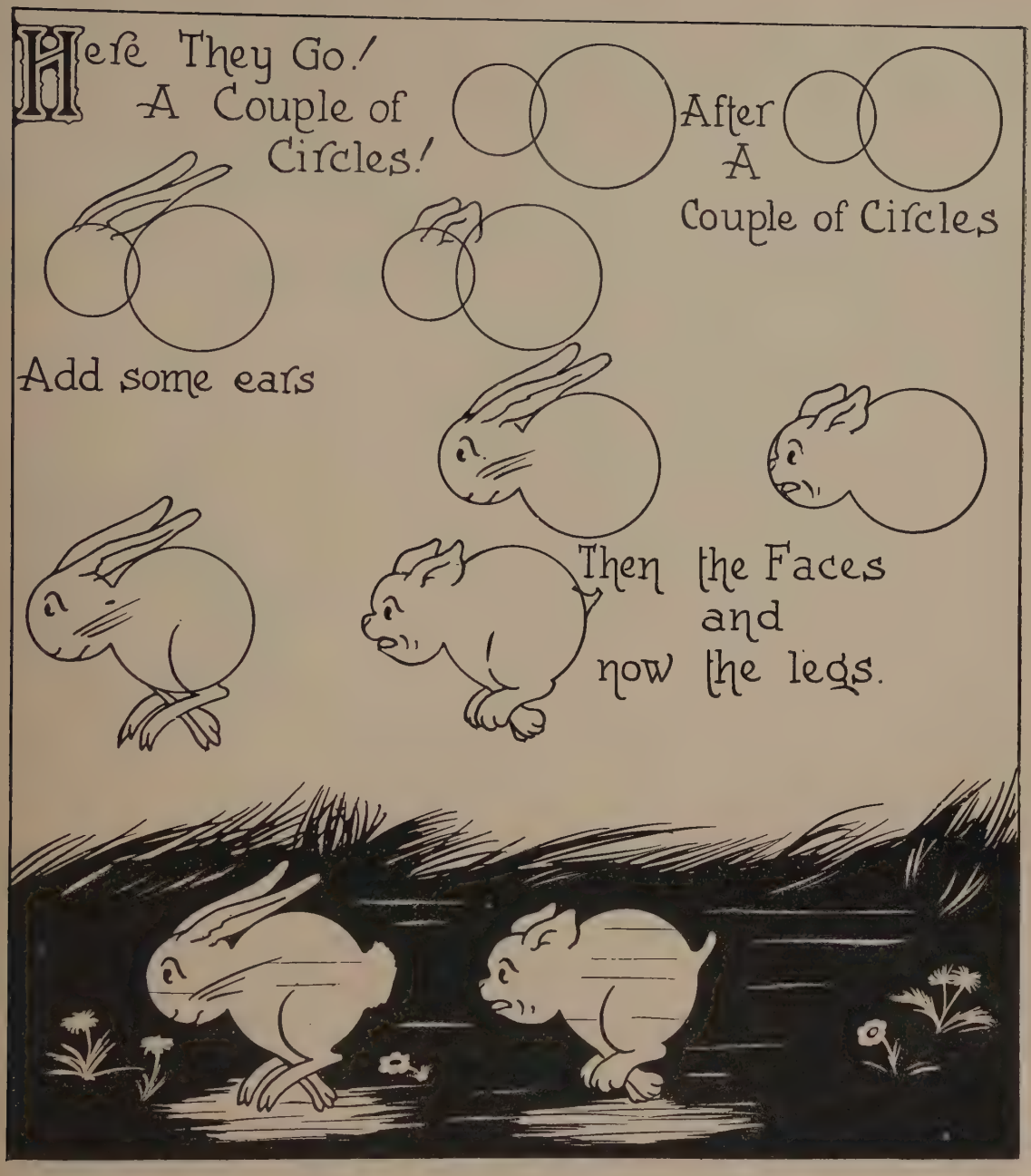
Note that in this picture eggs and not ovals are used for the foundation of your drawings. In this fact you have one of the secrets for making cartoons, such as those you find in the newspapers.



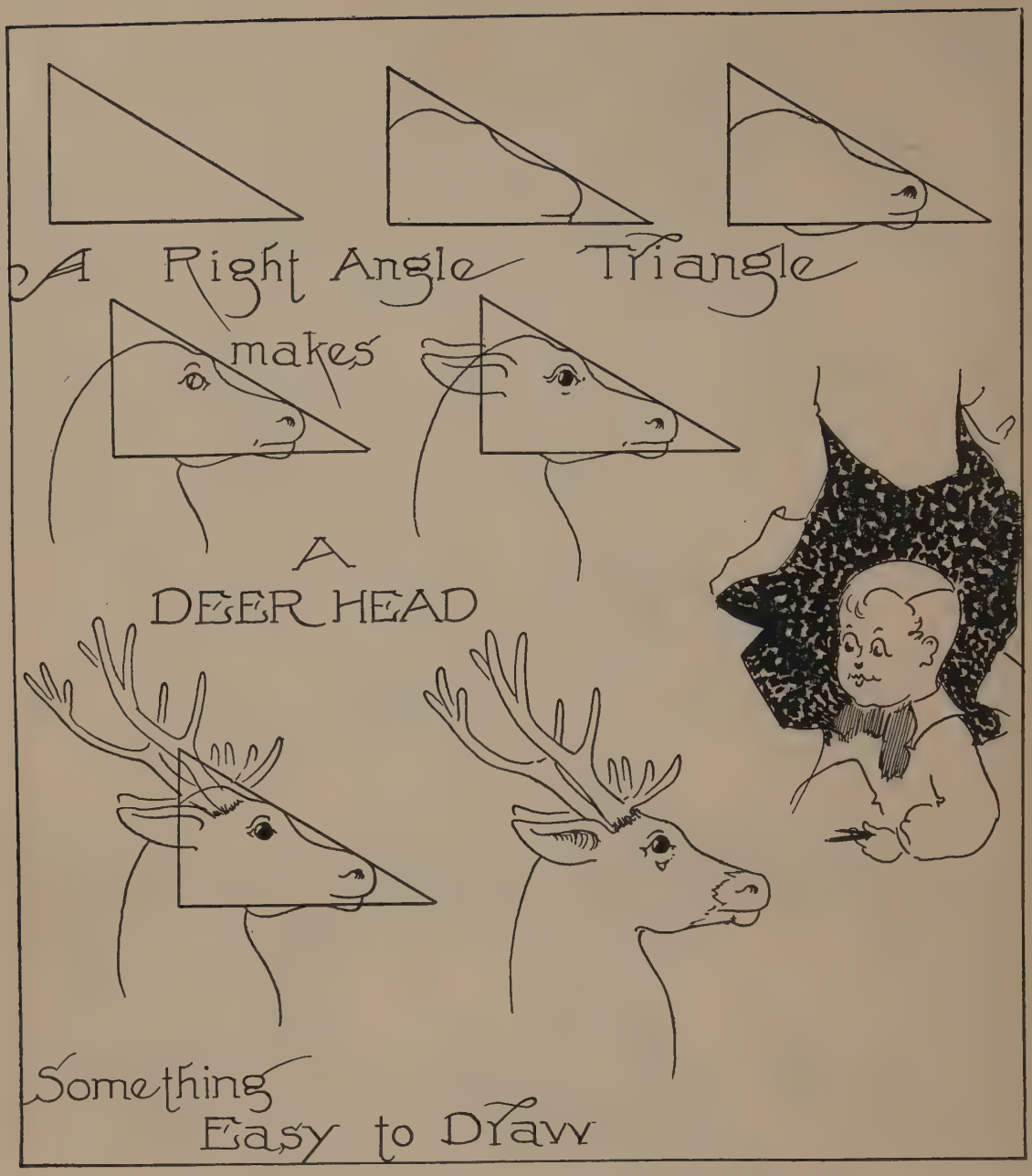
It will not be so very long before Thanksgiving comes again—not more than a year at the longest—and you will want to know how to draw a turkey. The task is an easy one with this system of two circles. Just try it and see for yourself.



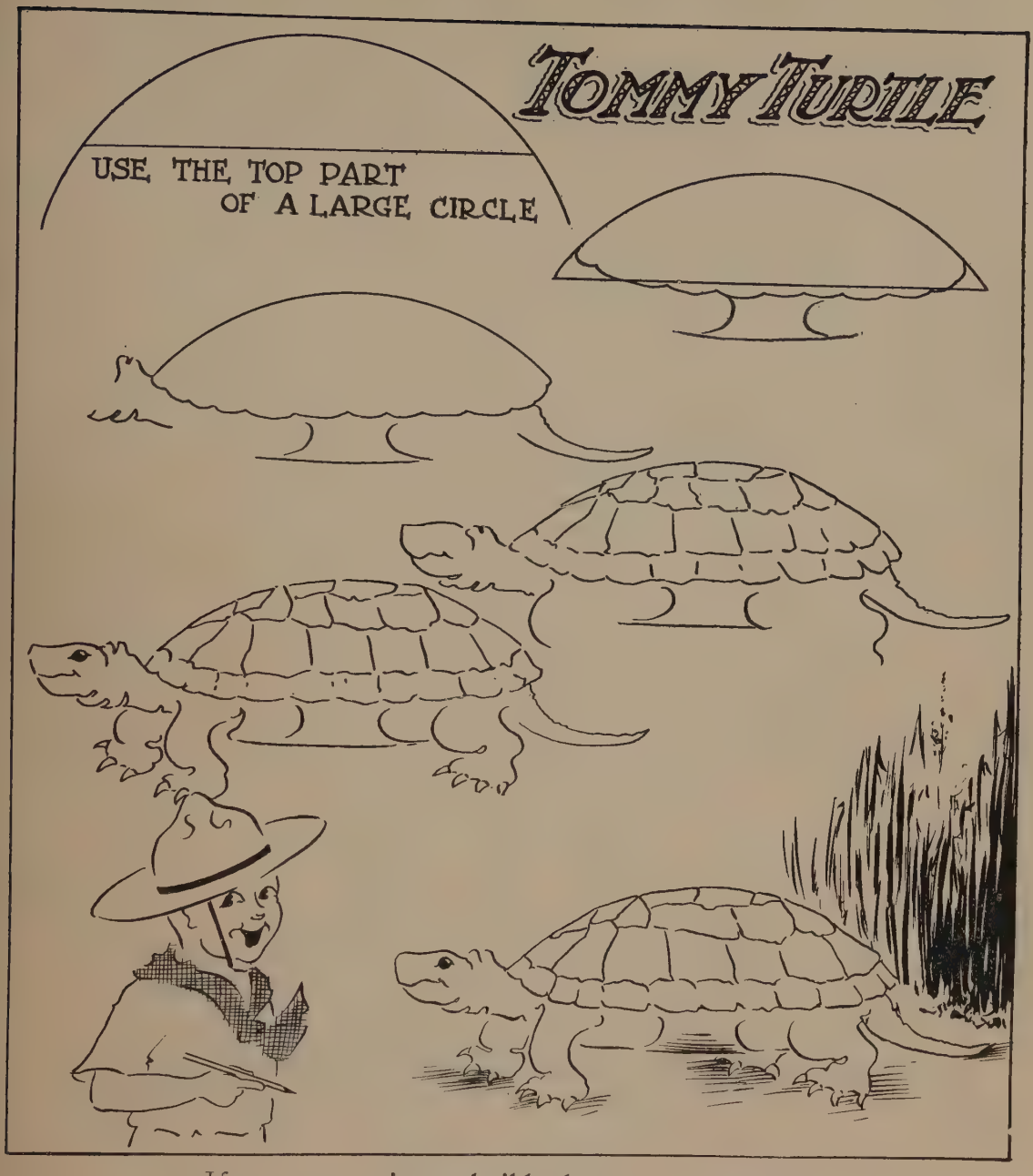
By starting with an egg, any one can draw this cartoon of "Greenie" the frog. Little by little the various features are added to the egg until it turns, as if by magic, into the jolly little frog of our drawing.



Here is a clever little cartoon that any one can draw. The only materials you will need consist of a compass, a pencil, and some paper. If you like, you can make your sketch (but not the book) more attractive by touching it up with water colors or crayons.



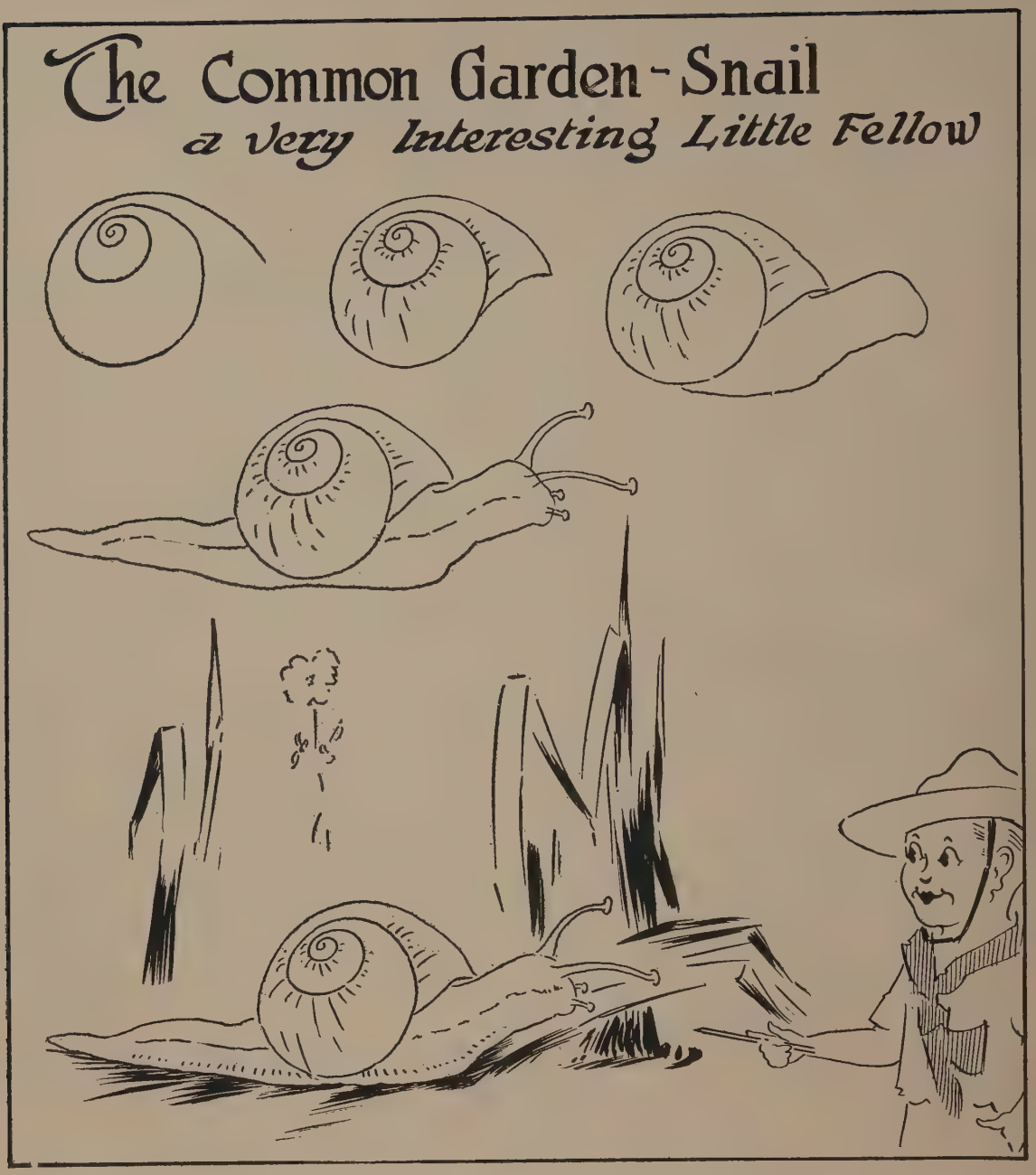
Would you ever have thought that a triangle could make the drawing of a deer head so easily? You can see for yourself, so there is no need of my telling you. Run, get some paper and try to draw it.



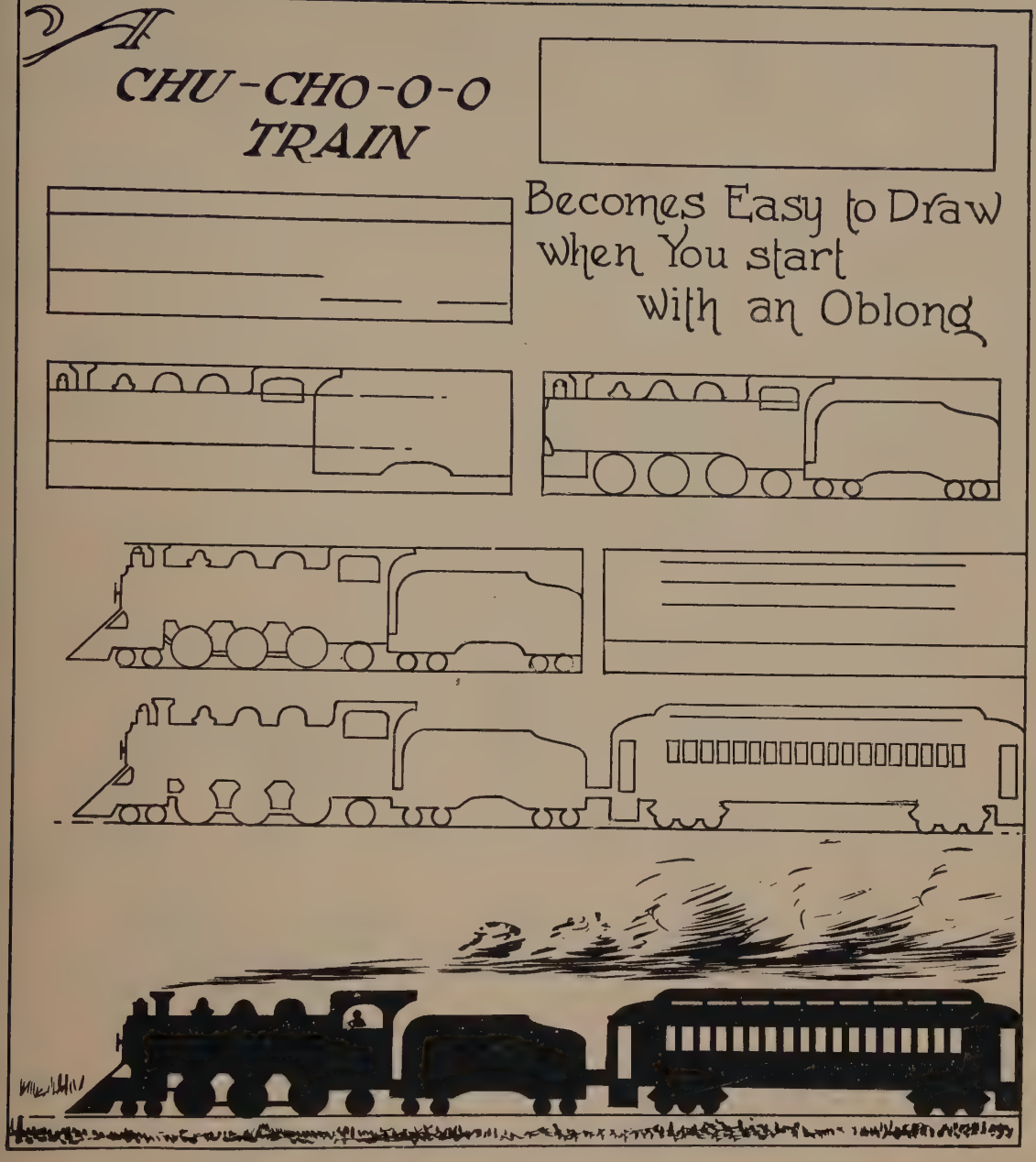
If you were going to build a house, you would start with the foundation and build up. Here is one case, however, in which this rule is quite upset. In building a picture of "Tommy Turtle" you start with the roof. The top part of a large circle makes the roof or shell of a turtle. Having this made, you will find the rest is easy.

The Common Garden-Snail

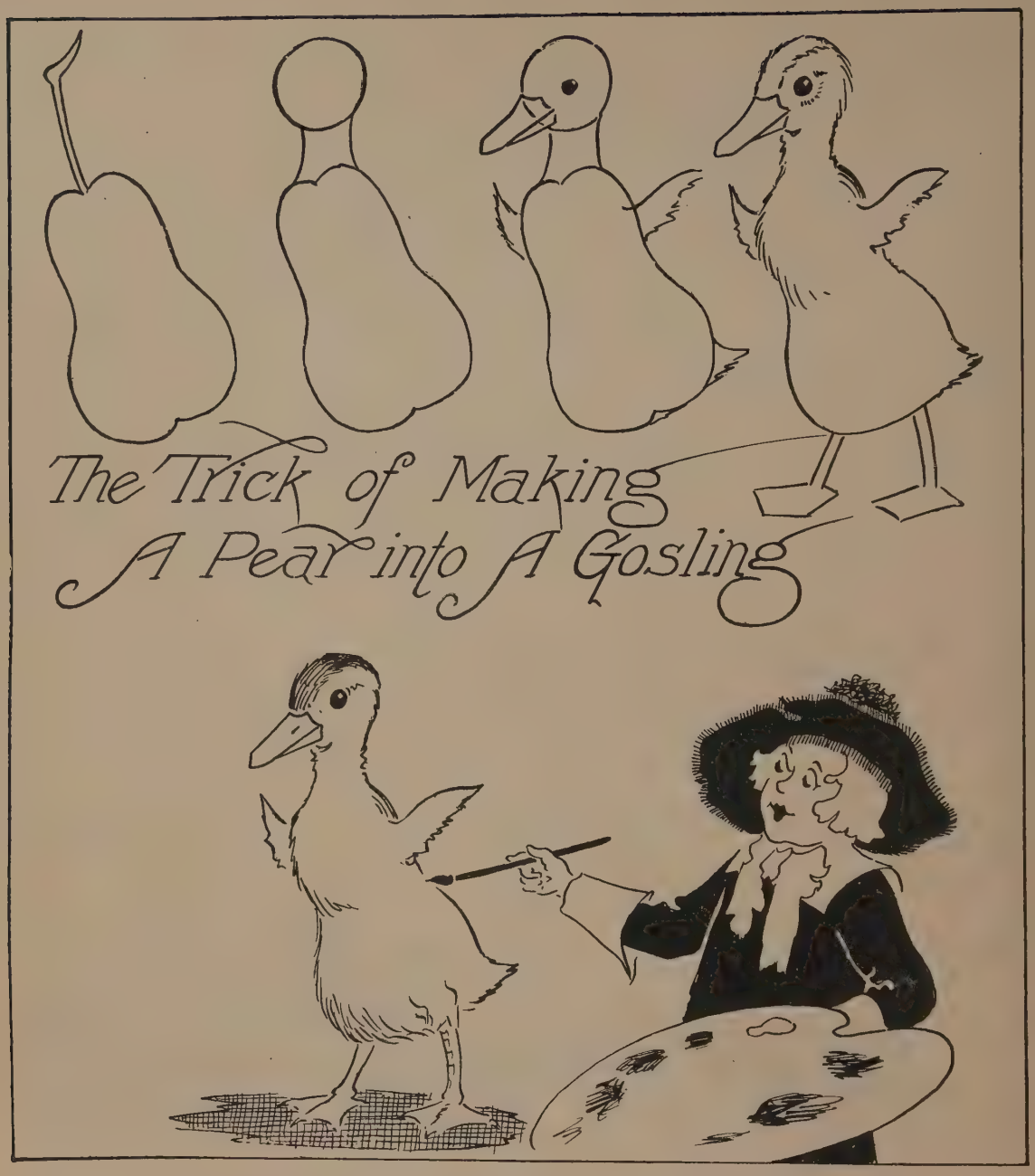
a Very Interesting Little Fellow



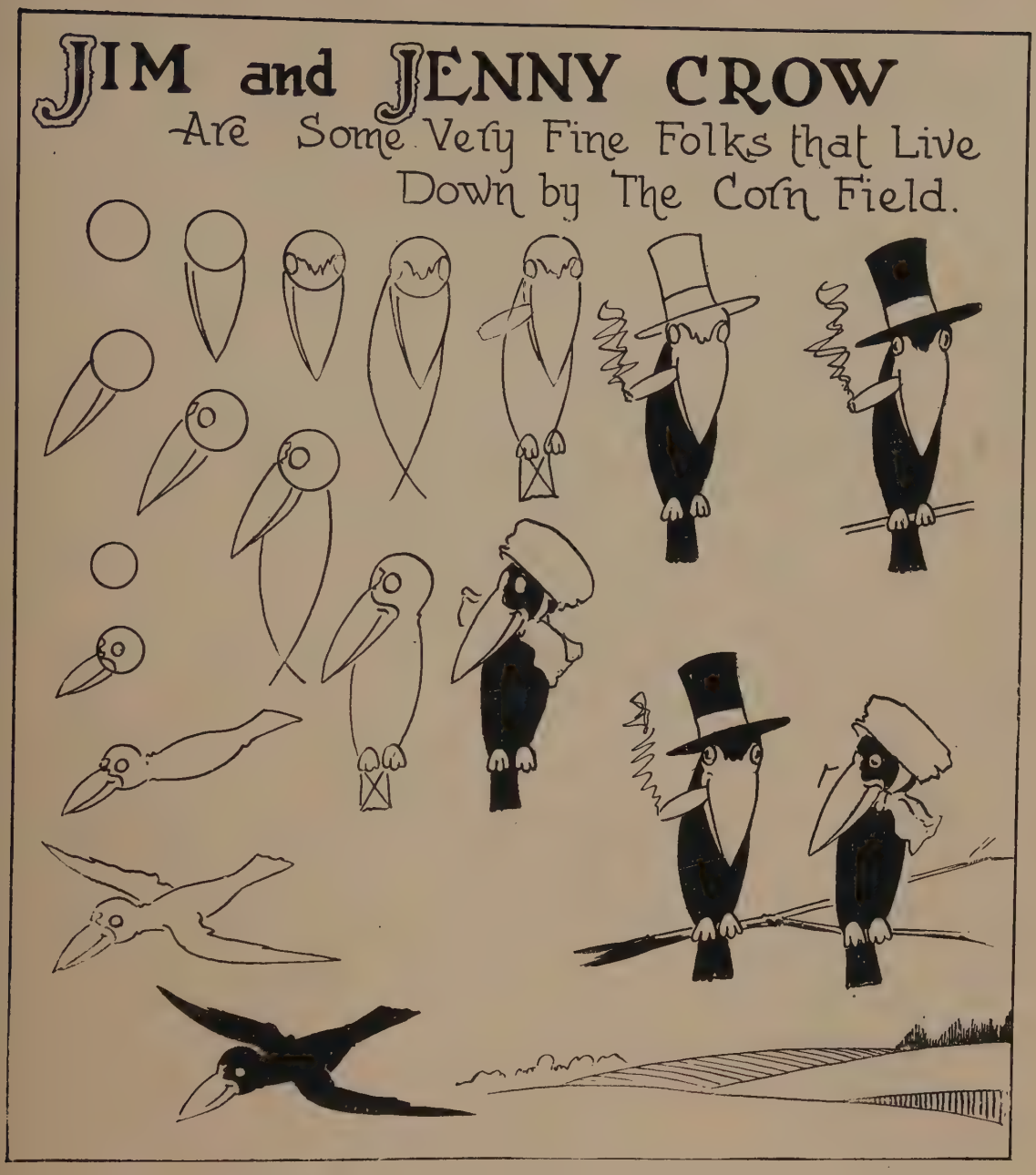
Would you like to know why a snail is so interesting? It is because his eyes are found on the longest pair of feelers. Another very interesting fact is that the common garden snail has 135 rows of teeth, in each of which there are 105, making 14,175 teeth in all.



When the artist who made this drawing was a little fellow, he tried ever so hard to draw a train, but somehow his drawings never looked anything like a train. Why? Because he knew nothing about how an oblong would make drawing easy. Just try and see how easy it is to make a good drawing of a train if you use an oblong.

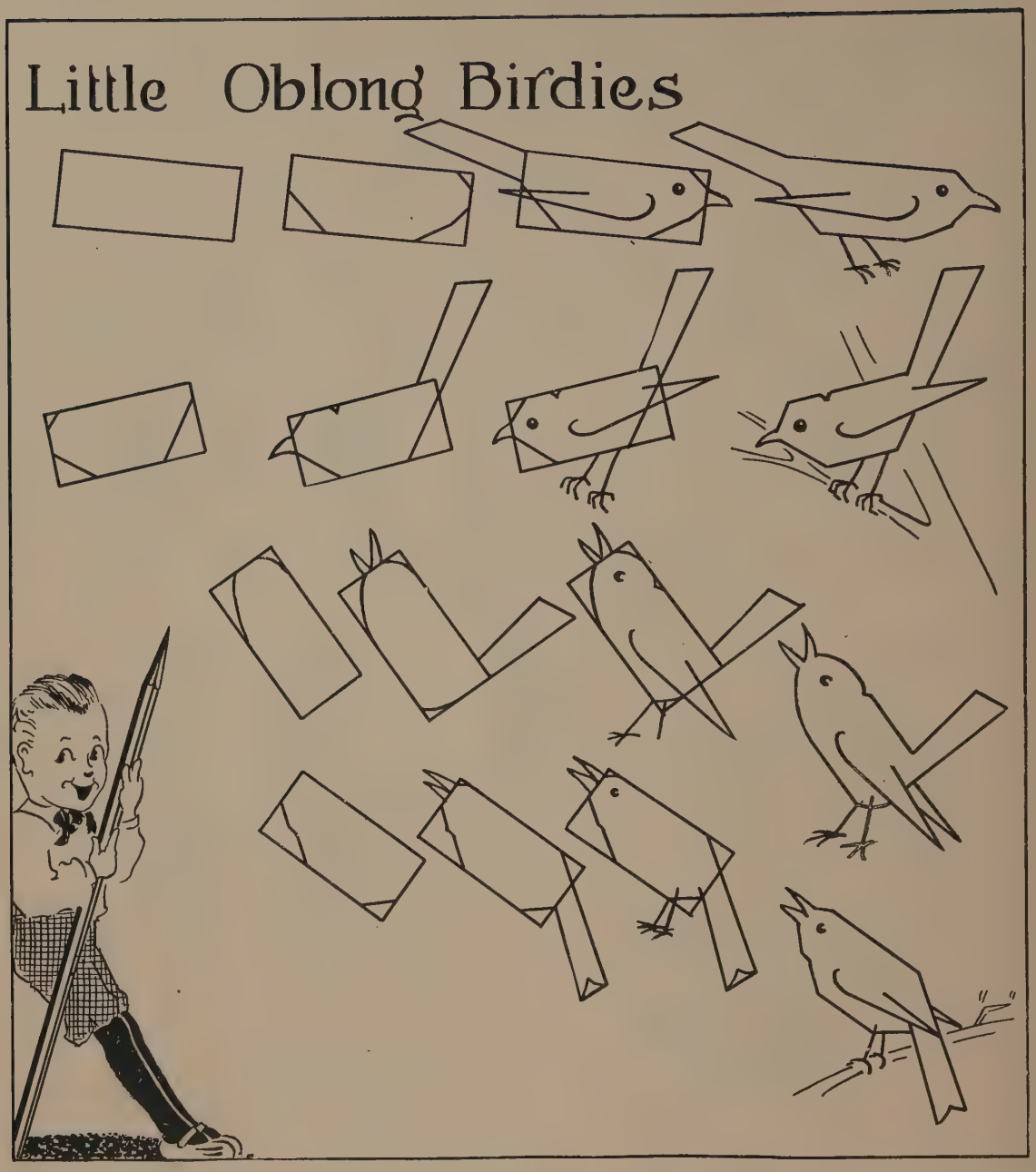


Did you ever see Mother and Father Goose take their goslings for their first swim? The family always forms a procession when they leave the barn yard for the creek, the mother at the head and the goslings following her and the gander bringing up the rear to be sure there are no stragglers. If one of the goslings strayed or fell behind, the gander would go after him. When they reach the creek the parents gently push them into the water with their bills. After the first time they never have to be pushed into the water again.



If we were you, we would practice making these pictures of crows. They will make clever decorations for place cards at your next party. Don't you think this is a good idea?

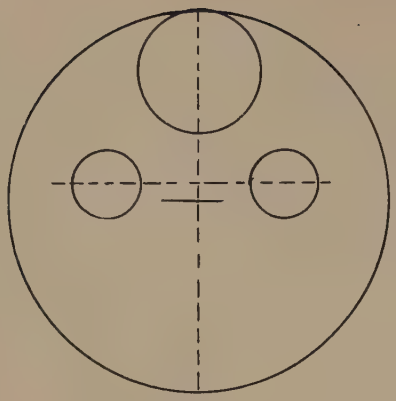
Little Oblong Birdies

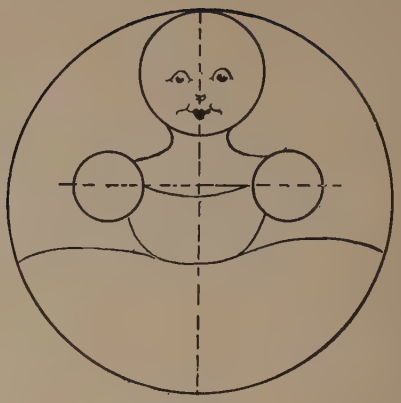


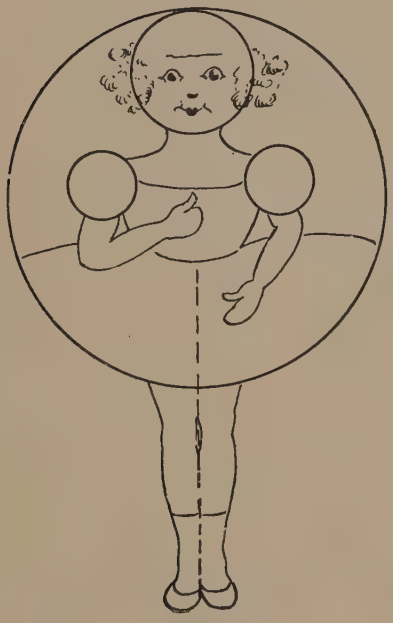
Here are birds in four different positions and all made from an oblong. The oblong makes it possible for you to make drawings that will be every bit as good as the ones you see here. Now get your pencil and paper and try drawing these birdies.

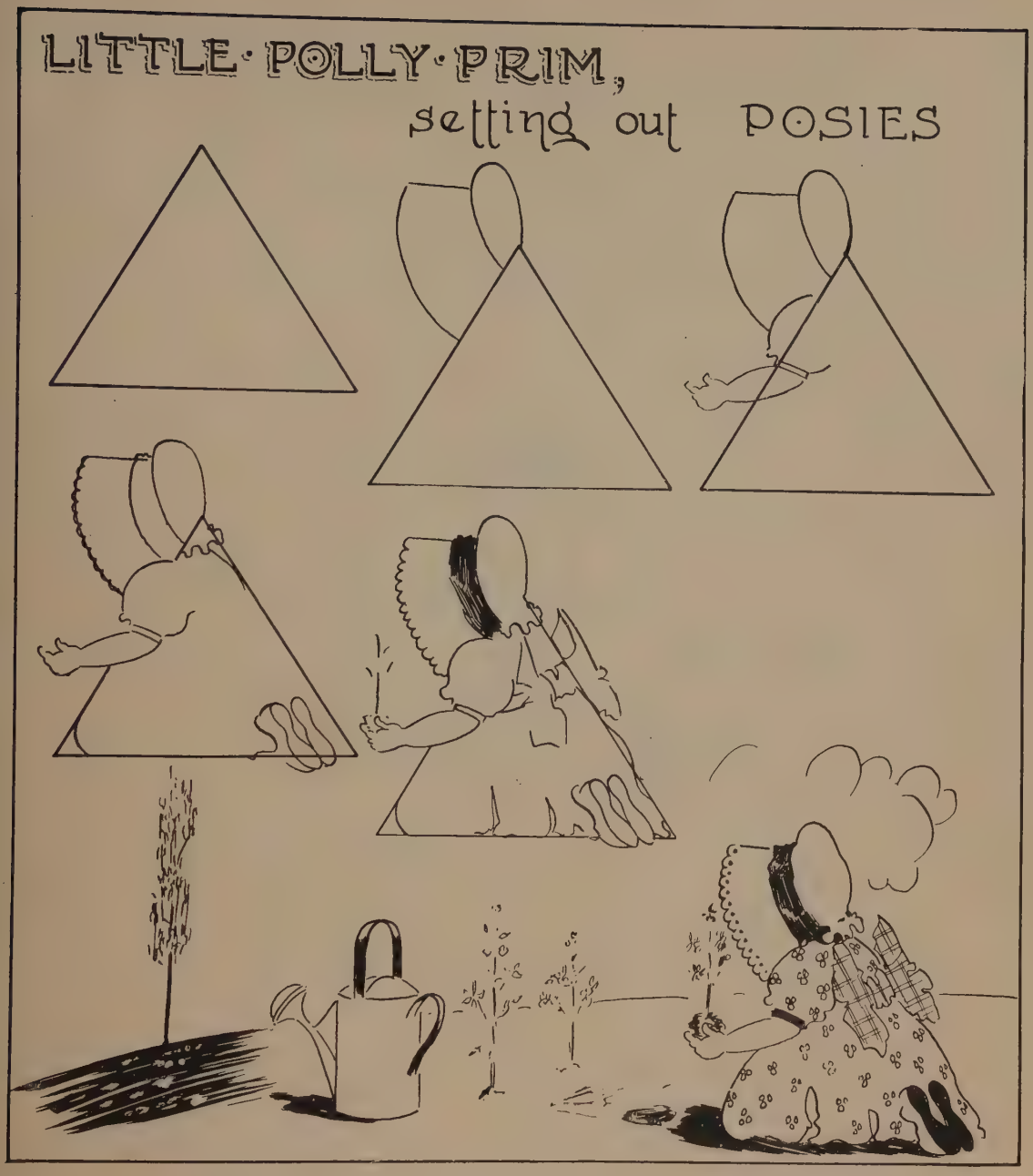
An oval and a pear are what you have to make first to draw a picture of a "Barnyard Argument." Then little by little you add to the pear and oval. The first thing you know you have your picture completed, and it will be just as good as the one you see here. Try it and see.

A Little Fairy



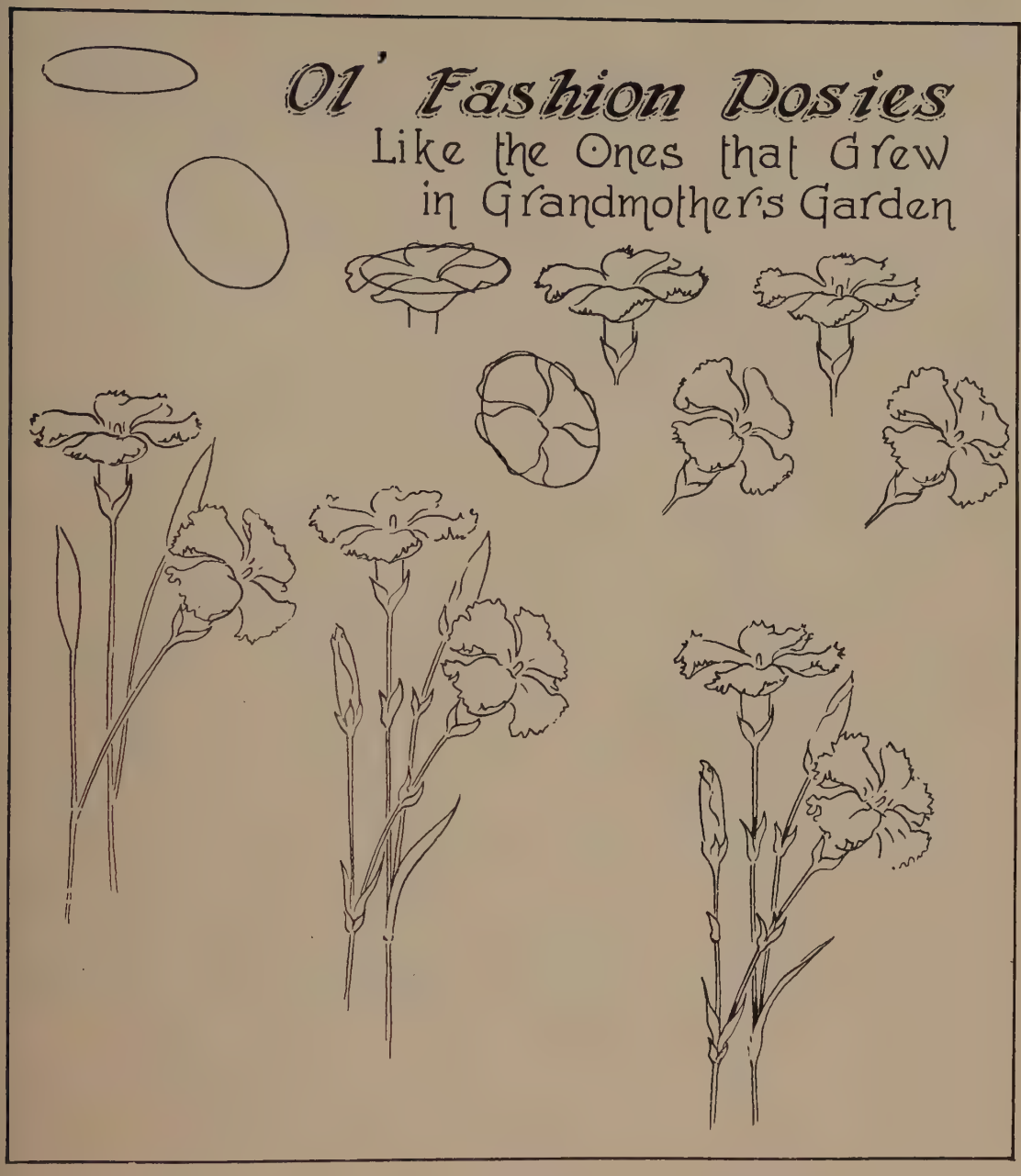






The triangle is one of the keys which makes drawing easy, just the same as the right key makes great doors easy to open. So with the triangle you unlock the secret that makes the drawing of Polly Prim easy to do.

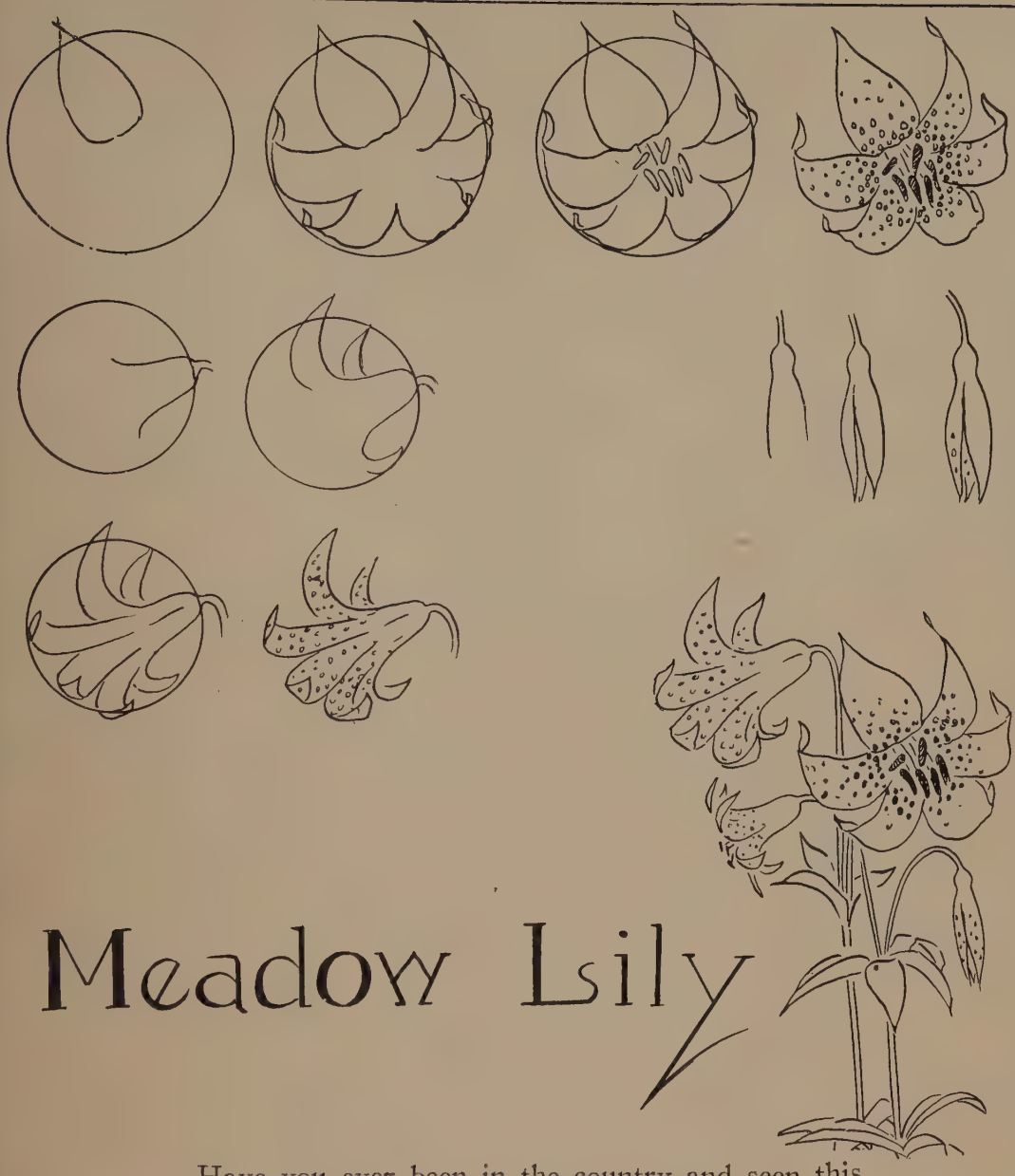
There is a lot to the picture of Little Almond Eyes. But to start with, it is very simple; just a triangle and two circles. With these three in the right places, you have made Almond Eyes easy to draw, because the circles and triangles act as little guide posts, telling you just where to place the other lines.



Have you a garden? If you have, be sure to plant some old-fashioned pinks—a very pretty flower with many gay colors. Even if you do not plant a garden there is nothing to keep you from drawing pictures of them. You can see for yourself just how easy it is to do.

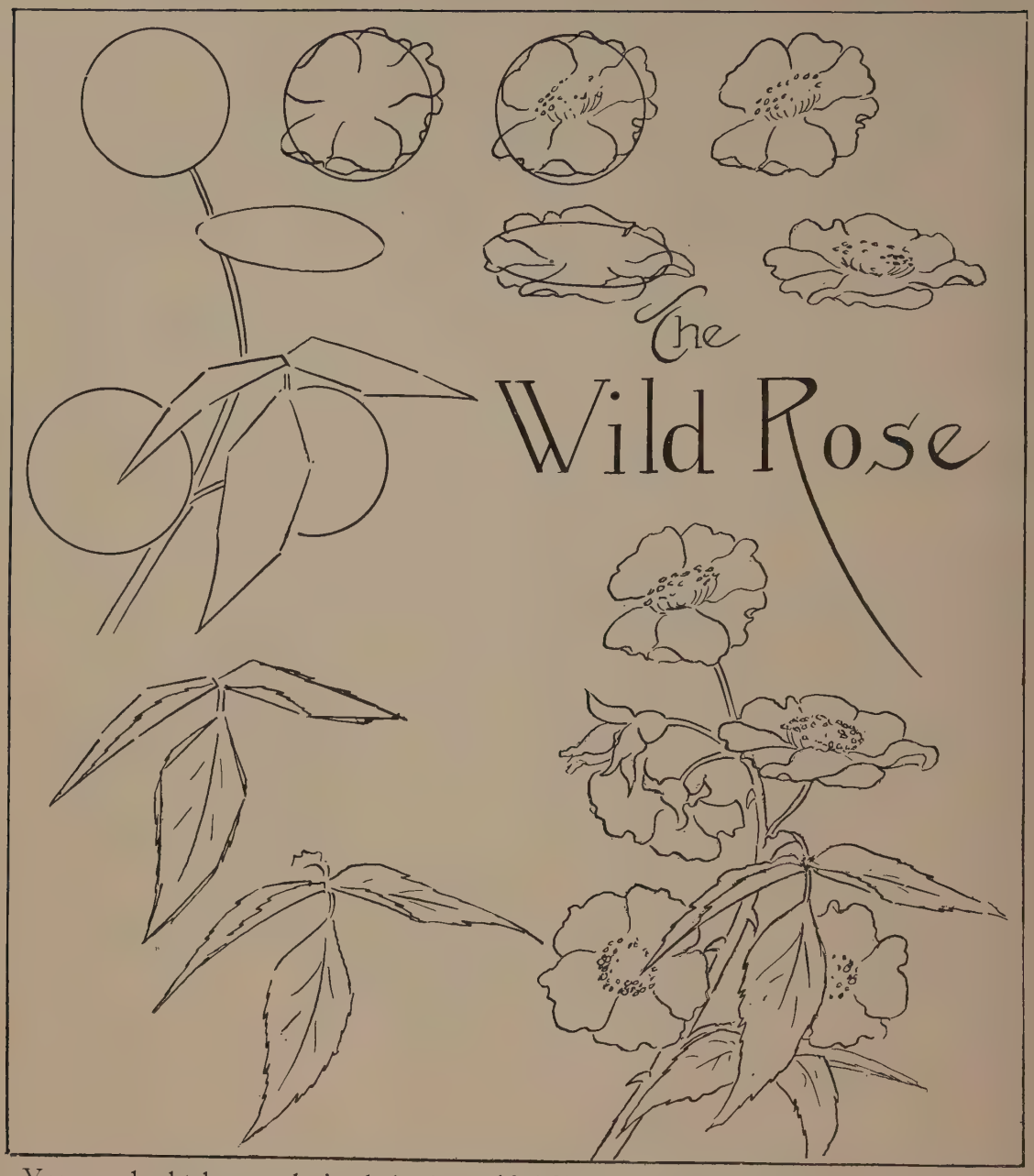
Blood-Root

In early April you find this attractive flower pushing its firm tip through the earth and dead leaves. When at a safe height it gradually unfolds its precious flower. You should be careful in picking this flower, for when the stem is broken a red juice oozes out. This juice leaves a lasting stain. This crimson juice was prized by the Indians for the war-paint they used on their faces and tomahawks.



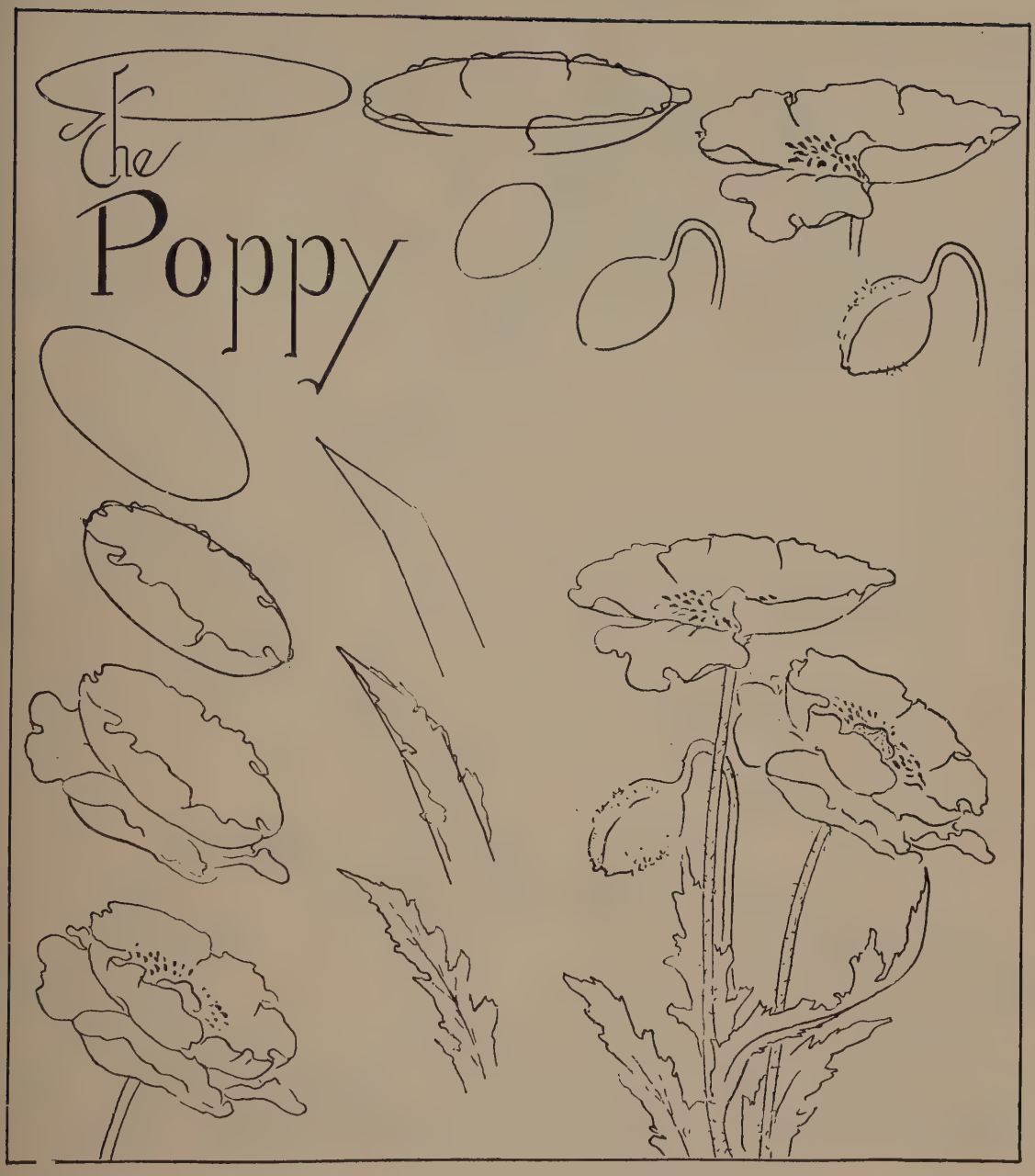
Meadow Lily

Have you ever been in the country and seen this pretty Meadow Lily in bloom? You find it in low meadows, moist fields and swamps, growing on a stalk about five feet tall. The flowers nod on long, slender stems from the top. They are yellow spotted with reddish brown, bell shaped and from two to three inches long. Get your water colors and see if you can make a water color sketch of these Meadow Lilies.



You no doubt have admired the beautiful Wild Roses blooming in some fence corner along the roadside. Perhaps you have even tried to pick them, but found it very difficult because they have so many thorns. If it were not for these thorns there would soon be no Wild Roses for the taste of the leaves is very pleasing to horses and cows. So the thorns grow on the rose bushes for their protection.

To color your drawing make each rose a soft, light pink, with yellow centers; the leaves, buds, and stem a soft gray-green.



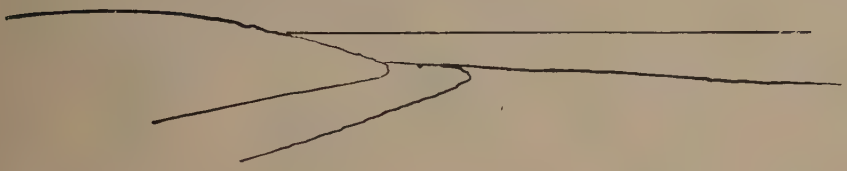
If you want to make some very attractive pictures for your playhouse, there is nothing better than the poppy for your subject.

Be sure to take your water colors or crayons and color *your* drawing. Color the flower petals a bright pink, the centers a golden yellow and the stem, bud, and leaves a gray-green.

Here is the most beautiful of all our wild flowers. In June it puts forth its first blossoms and continues until touched by frost. Its leaves are dark green above, pinkish on the under side and are somewhat heart shaped. The flowers are white or pink tinged and have yellow centers. They open shortly after sunrise, spreading a great feast for the bees, flower-flies, and beetles.

Easy Things to Draw

Combine all of Them Into One Picture



With an oblong that is three times as long as it is wide, and a triangle that is one-half the length of the oblong, you build the picture of "Ye Watchman of Olden Times." Won't you try it and see how easy it is to draw when you use this oblong and triangle.

PICTURE MAKING

PICTURES AND PAINTING

BY MRS. BERTHA PAYNE NEWELL

SINCE drawing is so nearly another kind of speech to little children, it should be made as full and free as possible. The way to do this is to keep drawing materials of the kind easiest to handle constantly accessible to children.

To me the blackboard and crayon are ideal, save for the dust of the crayon in the room. That, however, is an objection that does not obtain in the home where one or two, not forty, children are using it. The great advantage of the blackboard is that the drawings may be erased and repeated countless times without waste and with such ease of movement; and perhaps greater than this is the play it gives to the large arm muscles. Both the psychologist and the artist say that we cramp the child's powers by giving him small pencils to grasp, and hard pencils on which he must bear down to get a line. First-grade teachers say that after a child has once learned to grip his pencil at home it is next to impossible to get him to limber up and write with the loose fingers and easy arm-movement that is the great nerve-saving habit of modern writing. Then let us use the blackboard or large sheets of wrapping-paper and soft wax crayon or the big marking pencils used by carpenters.

PLAY-PRACTICE

For getting control of movements needed in drawing:

Use soft pencils.

Practice a free arm-movement, pencil lightly held in the fingers, arm resting on the table.

Swing round and round in big continuous "O's." Make this a picture of a ball of yarn.

Swing the pencil back and forth from left to right and make the "ground."

Beginning at the top of the paper, draw long strokes to the bottom of the paper.

Draw in the same way shorter fence-posts and cross them with "wire" or "boards." Right and left strokes.

Christmas Tree: Long, broad stroke from top to bottom for trunk. Downward sloping branches made with single strokes.

Poplar Tree: Branches sloping upward.

Elm, Maple, or Oak Tree: Branches slightly upward sloping, but many times branching into smaller and smaller branches.

THE OBJECT OF THIS DRAWING

Little children are not critical of the æsthetic side of drawing and painting; the aim is to say something with the drawing, not to make a beautiful thing. At first the objects are represented in an isolated way—a man, a dog, a chair, a tree. Then these things are used to tell a story.

The grotesquerie of these drawings should excite neither comment nor laughter in the presence of the artist, unless the child sees it as funny himself, in which case it will not check his efforts to laugh with him. The main thing is to put nothing in the way of free expression, and to give encouragement.

Suggestions can be given without concern as to whether they are adopted or not. Often questions and suggestions will keep children from settling down and adopting their own conventions for tree, flower, man, or what not as final, and will start them on a new track. For instance, in a picture of "Aunt Elsie wheeling her baby," the dress of "Aunt Elsie" disclosed an extraordi-

nary length of leg below the triangle which symbolized the skirt. I asked the little girl, "Does Aunt Elsie wear such short dresses?" Whereupon she hastily lengthened the garment by a scribbled addition. I have often called the attention of children to the fact that in real life legs are not visible through petticoats. I have suggested the addition of hands and feet, and so on, just to keep the attention moving and ideas growing in detail.

PAINTING

It is best to take the paints out for very little children. Use little pans or butter-plates. Dip the brush in water and wash paint from pan. Transfer to plate. Repeat with each color needed. This saves smearing one color over another in the box. Red, yellow, and blue are all the colors they need. They enjoy watching the mixture of these colors to produce others. Red and yellow blend to orange, blue and yellow to green, and red and blue to purple.

Each child should have a bit of old cotton cloth with which to dab up spots of color that fall where not wanted.

Teach them to rinse the brush in water before putting it from one color into another. Otherwise the colors will never be pure and brilliant. One day I sat down beside Robert to show him how to lay on the strokes for leaves. Unconsciously I dipped the brush loaded with green into the blue pan. Instantly the reproof came from the young man, "How can you tell us not to do that when you do the very same thing yourself?" I meekly accepted the correction.

BRUSH PRINTING

BRUSH PRINTING

METHODS AND DEVICES

Painting is drawing in color. Children go through about the same period of experimentation with the new medium that they do with any new material; first playing with the brush and color to see what they can do with it. They usually handle the brush like a scrub-brush, gripping it in the fist and scrubbing around. What a gorgeous trail it leaves in its wake! The brush is plunged into the paint again and the spot spreads till the paper is awash. "Mine is done!" says the embryo artist and looks about for more paper.

This is the time for a little direction. Let him choose another color, and show him how to sweep the brush across the paper from left to right, un-

til the long streaks blend, and a wash has tinted the paper smoothly. These washes, when dry, can be used for rugs in the doll-house or cut into paper-doll dresses.

A blue paper may stand for the blue sky overhead, a green one for the grass plot. Paste the blue above the green and you discover a landscape. To make it more real, reproduce the effect on one piece of paper, washing the brush of colors. If the sky is yellow above, shading into orange below, and then into red, let one *flow* into the other.

SPOTTING

While playing with the blending of colors show the children how to drop spots of one color into another and watch the shading of one into

STREAKING AND SPOTTING

when half-way down the page and laying on green. Add life to it by cutting out a bird-house and pasting on, or a flight of birds across the sky, or dot yellow daisies in the field as it begins to dry.

This is beginning where a child is and, as some one has said, "No matter where you're going, you must start from where you're at." The washes are just what the teachers in the art school teach as preliminary practice.

Call attention to the brown fields if it is Autumn, and paint them under the sky. At sunset notice the reds, yellows, and orange, and paint them. This is a good way to teach the *blending* the other. Let them make a circle with a round and round motion of the brush and spot it with another color. Children call these soap-bubbles. Try them in all combinations of color.

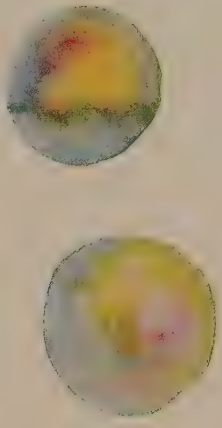
Little blobs look like beads. Thread them on a string by a sweep of the brush. Purple blobs dropped close together look like a bunch of grapes, red ones like cherries. They grow in pairs on tiny green stems from a brown branch. Yellow drops look like black-eyed susans when brown centers are dropped in them.

With these suggestions, your inventions and the children's will lead to much delightful play, full of discoveries as to color and likeness. So

WASH PAINTING—SKY AND GRASS

BALLS

BLENDING COLORS



BUBBLES

SPOTTING AND WASHING

far the pictures have been *happened* on. Soon they will try *purposefully* to make pictures.

BRUSH-PRINTS: PLAY AND APPLICATION

A wise old teacher of drawing in London told me this story: A little girl pupil laid down her brush fell of brown color unintentionally on her picture, and was distressed at the blot. To comfort her, Mr. Cooke said, "Oh, no, that is a mouse; see how your brush tip made his sharp little nose. I'll add this streak, for his tail." Her distress changed to glee.

Then he began to experiment with the print, setting his children to see what they could represent with it. They used it for leaves, petals, and decorations, and found it a great aid to invention. They arranged prints for leaflets along curving streaks for stems, and arranged them around dotted centers. I recommend this plan to you.

Fill the brush—a large one—and press it on the paper, being sure to let the tip leave the paper last. The surplus color left by the tip makes a pleasing shading.

After much experimental play with the brush, print; meanwhile the children will find how to lay the brush down cleanly, and how to lift it without scattering the paint. They will be ready to combine the prints into pictures of mice, rabbits, beetles, leaves, and flowers. Now if you will show them how to paint two long parallel bands across the top of a sheet of paper, they can fill the space between the bands with patterns. Call their attention to the frieze on wall-paper, to the borders at the top of book-covers, and to similar applications of this border-like design. Paper the doll-houses with these designs.

Another application of these designs that will be even more suited to their interests and ability is found in decorating paper picnic-plates that may be had at any ten-cent store.

PAINTING IN OUTLINE

After playful practice in washing, streaking, spotting, and printing, children are ready to paint within boundaries requiring more muscular control.

Draw outlines of simple forms, a chicken, house, apple, leaf, and let them fill it in with the brush.

Let them draw their own outlines by putting a tumbler on the paper upside down and drawing around it. Fill it with color for a balloon. Make a number of small balloons, and draw or paint lines from them, meeting below as if held at one point.

Do the same and float colors over one another. When color "runs" outside the line, blot it up with a slightly damp rag.

MODELING

BY MRS. BERTHA PAYNE NEWELL

Autumn fruits, nuts, and vegetables, animals and birds, bowls and dishes, flower-pots, flower-forms in relief, are all suitable subjects for modeling.

In modeling fruits and vegetables it will help to notice the relation of the thing to be modeled to a ball and roll the clay in the rounded palms until it is spherical, then modify it; to a tomato by flattening a little, or to a pear by rolling more at one end and then adding more clay, welding it on by pressing and smoothing and rounding it with the fingertips. A bit of twig thrust in for a stem is more satisfactory than to model a stem, as the latter is too fragile.

Begin with something with which the children are very familiar, such as one of their pet rabbits. It is well to have the lively model near by, though the children will not often compare their work with the object to be copied. They work from the picture left in the mind by previous acquaintance with the thing.

Notice the general shape of the body. In the mouse, rabbit, and squirrel it is almost egg-shaped, from the round of the back, including haunches, to the tip of the nose. Model this shape and then add shaping of haunches, nose and ears and tail.

The little toy animals make good models. The forms are well done and so small that the children can pass their hands over them and *feel* as well as see the form.

Toy dishes can be dried awhile and then baked in the oven of the range. This will make them a little more lasting, but to be hard as real pottery they need to be fired in a real pottery kiln, which is not worth while, as they will be making things in the later years that they will really want to keep. The main thing in their minds now is the

play of the moment, and in ours the training in seeing and creating that this work gives them.

Flower-pots made large enough to hold a bulb or a few seeds can be made and used for their spring planting.

These figures serve as a record of the beautiful shapes of some of the spring flowers. They may be used as paper-weights.

Mold a ball about two inches in diameter.

Flatten it by passing on the smooth table, first on one side and then on the opposite, until it is about a third of an inch thick.

This makes the plaque or background.

Three-leaf Clover.—Roll three little balls about half an inch in thickness. Elongate them a little by rolling and press them out into ovals (not too thin). Lay them in the center of the plaque in clover shape. Roll a stem and apply.

Four-petaled Poppy.—Follow same plan as above.

Five-petaled Flower (apple blossom or rose).—Notice the cupping of the petals and their narrowing to the point at the center, also the cluster of stamens that may be simulated by a little ball planted where the petals meet and *stabbed* with a toothpick until it is deeply roughened.

Six-petaled Flower (daffodil or narcissus or Chinese lily).—Notice the pointing of the petals and the ridging in the center. A tiny green ring in the center surrounds three tiny dots (pistil).

COLOR — DESIGN — DRAWING*

BY BONNIE E. SNOW AND HUGO FROELICH

THE BEAUTIFUL COLORS OF THE RAINBOW

Did you ever hear of anyone who had never seen a rainbow? Or did you ever hear of anyone who did not know where a rainbow is sometimes seen, or who did not enjoy looking at the beautiful band of colors that the rainbow shows us? It is always a glad surprise when we see a rainbow, and we delight to be the first to point it out, and to say, "Look! A rainbow!"

Would it not be wonderful if we could in some way bottle up the colors of the rainbow, and use them to paint with? Or, if we could only use the actual colors of the rainbow for dyes, what beautiful fabrics and garments we should have! But alas! we cannot save the lovely colors, any more than we can save the sunshine, to use on a rainy day!

But the rainbow has taught us many things about color. Of all the colors that we know about in this world—flowers, and birds, and insects, and precious stones—none are so pure as the colors in the rainbow. So the rainbow has become our standard of color, just as a well-tuned piano may be taken as a standard for musical tones.

You know that this old earth of ours has supplied for thousands of years the things that people must have in order to live. The earth gives us wheat and all other grains, besides all plants and vegetables that are used for food. The earth gives us wood, stone, brick and other materials to build with. It provides the means of shelter for us. And the earth also gives us our clothing, for we raise cotton, sheep for wool, and worms that spin a silken thread for our fine garments!

So the earth provides us with substitutes or representations of the colors in the rainbow. We call these substitutes "pigments," and we find them in many plants and vegetables, in some insects and animals, and in mines deep down in the earth. From pigments we make paints and dyes, and all the colors that we use in printing. But the rainbow colors are always the standard, and we are constantly trying to make our pigment colors more like them.

The color chart shows six colors that are as pure and bright as pigment colors can be made. Three of these, yellow, red, and blue, we cannot make by mixing two or more pigments together. They are found in pigments just as they are, and are called primary or "first" colors, because by mixing them together in different quantities we can make all the other colors in the world. This seems strange, does it not? But you will soon see how some of these many colors may be made. Indeed, you can make many of them yourself!

An easy way to make liquid colors that can be used for mixing is to soak crêpe paper in a small quantity of water. Get the brightest yellow, red, and blue crêpe paper that you can find. Put a sheet in each of three bowls, yellow in one bowl, red in another, and blue in another, and pour about a pint of water over each. In a few minutes you will see the color leave the paper, and in about ten minutes you can squeeze the wet paper as nearly dry as possible and throw the mass away. In the bowls will be left some beautiful, strong, liquid colors—yellow, red and blue.

Now take three glass tumblers, and pour in one a small quantity of yellow dye, about a third of a glass. Pour into this same glass a small quantity of red. Pour it slowly, and stop when you see in the glass a color like orange. Now you see how orange, a new color, is made by mixing yellow and red.

In the second glass, pour again a small quantity of yellow dye. Add to this a very little blue. What have you made? Green! By adding a little more yellow or blue, try to match the green circle in the color chart.

In the third glass, pour a small quantity of red dye. Add a little blue. You have made a third new color, violet. Now you have in your bowls and glasses all the colors that are shown in the color circles.

Orange, green and violet are binary colors.

*The illustrations are from the "Snow and Froehlich Industrial Art Textbooks," The A. S. Barnes Company, publishers, and are used by special arrangement with the authors and publishers. Now published by Laidlaw Bros., New York, N. Y.

"Bi" means two, and these three colors are called binary because each is made by mixing two primary colors.

Sometimes we wish to use colors that are lighter than the bright colors we have just mixed. It is very easy to make light yellow or light green, light violet, or a light tone of any color. All we need to do is to add water to the right tone. Try it by filling a tumbler half full of clear water and adding a few drops of any one of your strong dyes. You will see a light tone of the color you add. Light tones are called "tints."

You can make a dark tone of any color by adding black to it. Pour a little strong dye into a glass and add two or three drops of black ink. You will have made a shade of the color you added. The strong bright colors like those in the circles in the color chart are called normal colors.

You now know how to make all the colors, tints, and shades that are shown in the color chart. We shall use these colors in many interesting ways, in making useful and beautiful things, described in the lessons which follow.

HOW TO PRINT WITH COLORS AND STICKS

Your handkerchief, or your hair-ribbon, or the tablecloth, or the rug on the floor, is probably decorated with a border. Look about you, and see how many designs you can find. Probably the wall-paper has one at the top. Very likely the curtains are "trimmed" with borders. The towels in the bathroom or in the kitchen are quite sure to have them. A border, then, is a common means to make useful things beautiful.

We are going to print some borders! We have no press, it is true, but there are several other ways of working. Probably you have used a rubber-stamp outfit in printing your name a number of times. Our border-making materials are something like that.

From the school supply houses you can buy a little box containing three pads, or pans, of color, and several short sticks whose ends are shaped like those in the illustration. But if you have no such box you can make a printing outfit for yourself.

For the colors, you can use the strong dyes made from soaking crêpe paper in water, as described on page 39. Or you can print with colored inks. If your mother has some strong indigo, or bluing, such as is used in the laundry, that will print a beautiful blue. If you own a box of water-color paints, you can simply moisten the colors and use those.

For printing sticks, you can use the unsharpened ends of lead pencils; the ends of small corks; shapes cut from rubber erasers; the ends of matches; short ends or chippings of reeds used in making baskets; shapes like those in the illustration cut from raw potato or carrot; or you can whittle from soft wood short pieces whose ends are round, or square, or triangular.

You must also prepare a printing pad. A piece of old outing flannel, folded into four thicknesses, will do very well. Place this on a saucer or on a bit of cardboard, and pour a few drops of your liquid color on it. Pat the end of your printing stick repeatedly on the pad, until the color is evenly spread. Then, on a piece of manila or white drawing paper, press the end of your printing stick, to see if you can make a good "impression." Press the stick to the pad between each printing.

On your practice paper, print all the different shapes you have, until you have learned to print evenly. You are now ready to print a border.

BORDERS PRINTED IN ONE COLOR

To print a border of squares or circles in a straight, even row, with all the shapes exactly the same distance apart, is not as easy as it looks. Just try it, on paper that is not ruled in squares to guide you. Probably your row will run up hill or down, and your shapes will be unevenly spaced.

It will be best for you to rule several strips of paper, each 6 inches long and 1 inch wide, into inch squares, as shown in the illustration. The squares will help you to set the stick down exactly in the middle of the inch space. If this is done with each printing, the spacing will be even, and the top and bottom margins will be alike.

Use but one color in each border. Print on manila or white drawing paper. See that your color pads are well soaked with color. Try to make all shapes even in color.

These strips of paper, neatly printed in yellow, or red, or blue, will make fine bookmarks.

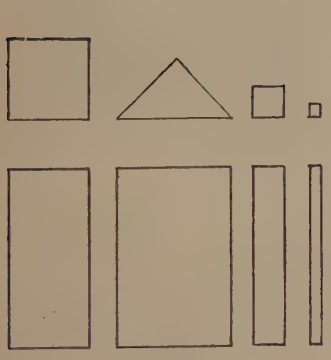
MAT WITH A STICK-PRINTED BORDER

A vase of flowers or a plant in a jar will often mar the polished surface of a table. To prevent this, a mat is most useful. Now that you have learned to print a border on paper, you are ready to try printing on cloth.

Plan a mat that will be 8 inches square, including the fringe. It must be made of some thin material, like cheese-cloth, or a very cheap qual-

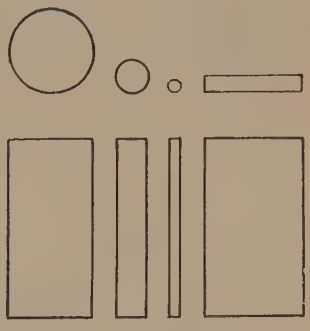
NORMAL COLORS. TINTS. AND SHADES

Stick Printing



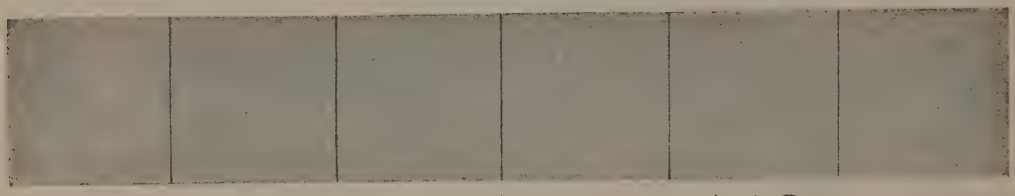
Sticks

Color Pans

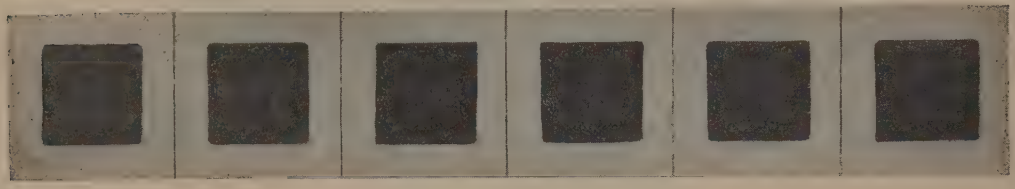


Sticks

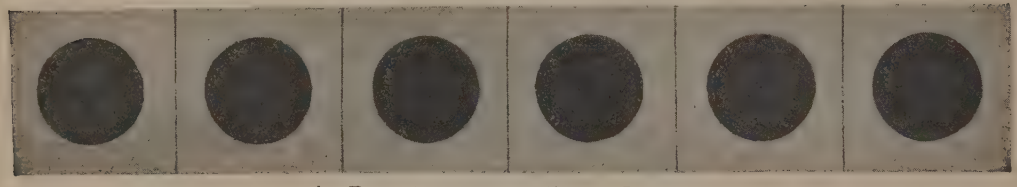
ity of unbleached muslin. Fig. 2 in the illustration is made of stencillex, which is buff in color and somewhat stiff, like lining canvas. Fig. 1 shows an 8-inch square of white paper ruled into inch squares. This ruling should be done with a very soft lead pencil, because the lines must be heavy enough to show through the thin cloth of which the mat is made. Cut an 8-inch square of the cloth, place it carefully over the ruled paper square. It would be a good plan to fasten the paper and the mat to a board, using an upright pin at each corner. This will keep the cloth from slipping while you print. You should be able to see the ruled squares plainly through the cloth. In the second row of squares from the edge, print a border of squares or circles. Use one color only—yellow, or red, or blue. Fig. 3 shows you how to do it. If you do this neatly,



1"X 6" Strip of Gray Manila Paper Ruled in Inch Squares



A Border of Red Squares



A Border of Yellow Circles

you may print a small circle, or square, half way between each of the larger shapes, as shown in Fig. 4.

Fringe the edges of the mat for about an inch. You might make another mat, printing the border a different color.

A STICK-PRINTED HOLDER

Did you ever know father to burn his fingers when he lifted the cover from a dish of hot vegetables? Or, is the handle of the tea or coffee pot sometimes so hot that mother cannot hold it? What is needed is a set of pretty holders, nicely decorated with stick-printed designs, in several different colors. How proud you will be to be able to make such a set!

In your mother's piece-box, or scrap-bag, probably you can find some pieces of checked gingham. If the checks or squares are a half-inch in size, and if the colors of the gingham are green and white, or blue and white, or red and white, you will be very lucky, for this material is just what you want.

Cut two 6-inch squares of gingham for each holder. Trim the edges very neatly, so that the margins around the squares will be alike on all sides, as shown in Fig. 1 in the illustration. Make your printed shapes in the same color as the color of the gingham; that is, if you have blue and white gingham, print the shapes in blue; if you have red and white gingham, print the shapes in red; if you have green and white gingham, print the shapes in green. Fig. 2 shows you a

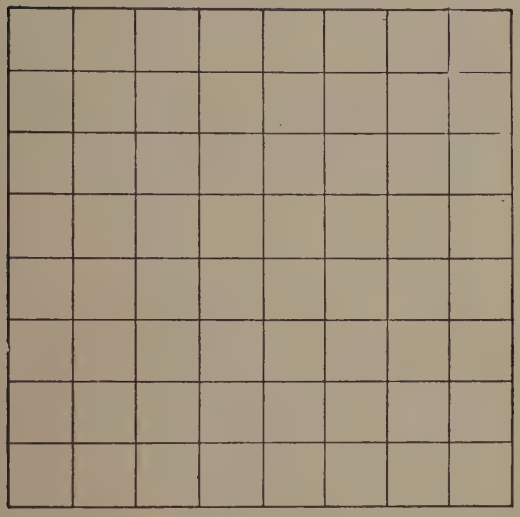
border printed, and Fig. 3 shows an extra square printed in each corner, which makes the design more interesting.

Cut a square of old outing flannel a little smaller than the gingham squares. Baste this lining to one of the printed squares. Lay the other printed square carefully over it; turn in the edges, and sew them "over and over." Sew an ivory ring to one corner, so that the holder may be hung up, when not in use.

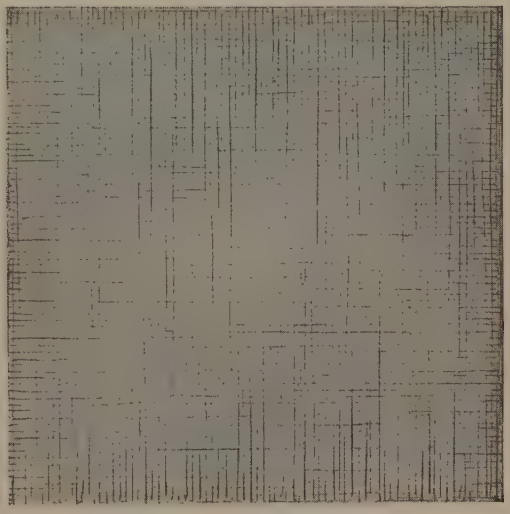
A PIN-SQUARE WITH STICK-PRINTED DECORATIONS

How much more a gift is worth if we design it and make it ourselves! The little device for carrying pins, which is our next problem, will be most welcome to one who travels, as it takes up very little room, and holds securely a great variety of pins.

You will need two pieces of white cardboard,



· Fig. 1 · 8"×8" Cream Manila Ruled in Inch Squares



· Fig. 2 · 8"×8" Stencillex

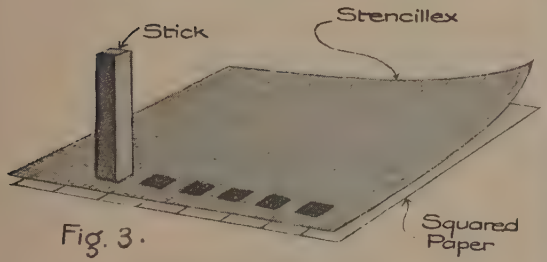
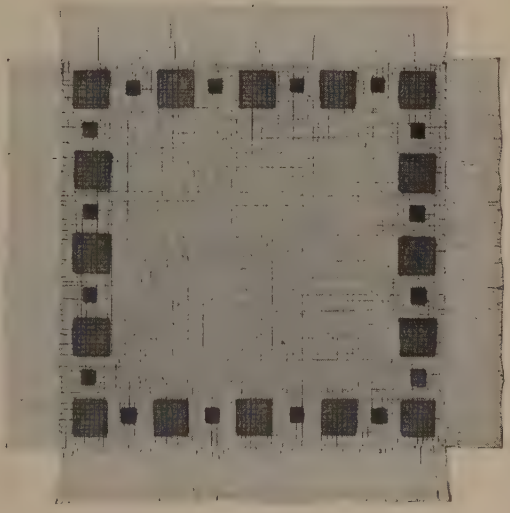
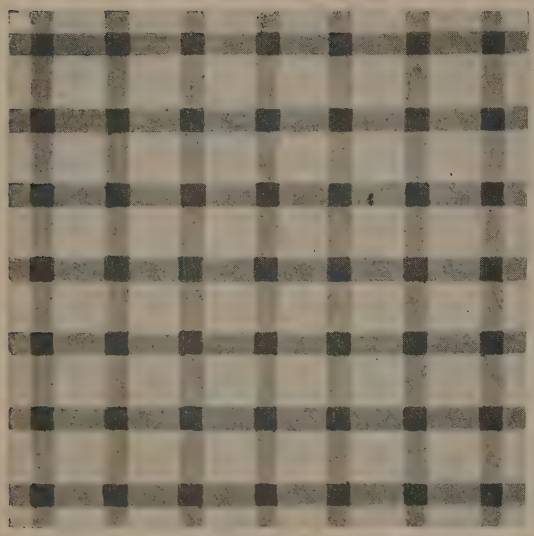


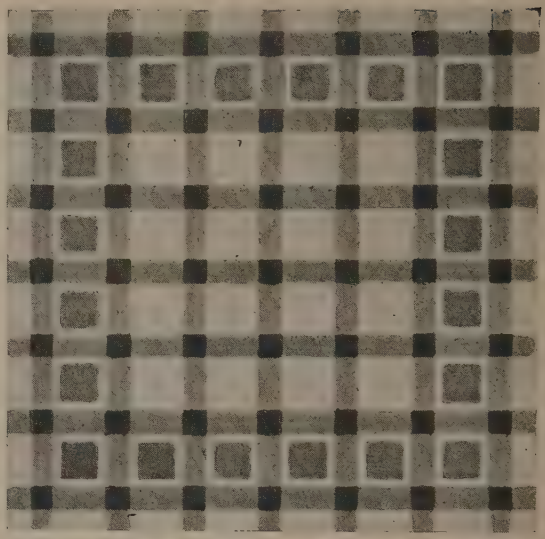
Fig. 3 · Process of Printing Stencillex over Squared Paper



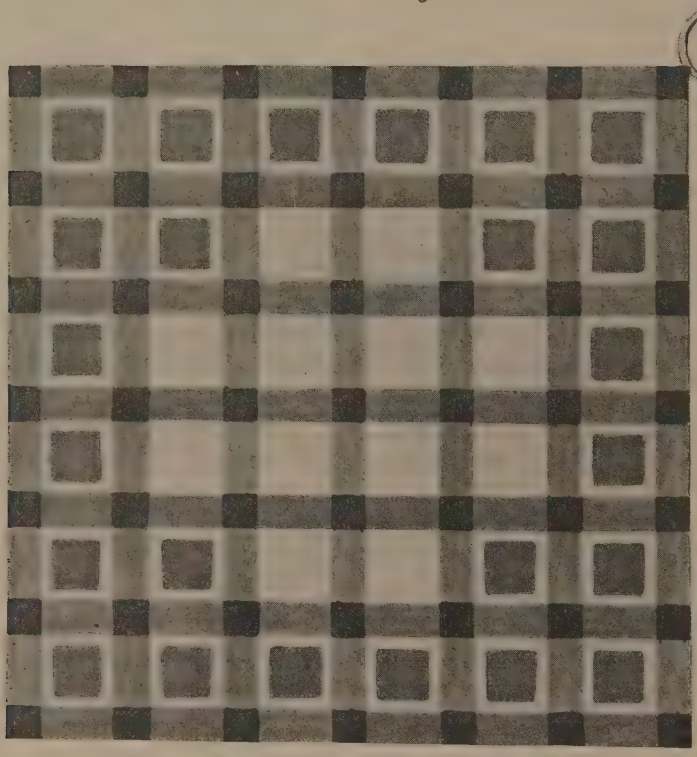
· Fig. 4 · The Mat Completed



· Fig. 1 · 6" Square of Gingham



· Fig. 2 · First Step in Printing Design

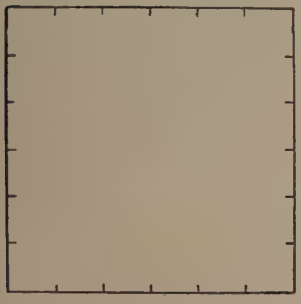


· Fig. 3 · A Hot Dish Holder

cut 3 inches square, and ruled off in ½-inch squares, as shown in Figs. 1 and 2. Then cut two pieces of thin muslin or silk, light in color, each piece to be 5 inches square. Place one of the cardboards upon the square of cloth, so that the ruled lines on the cardboard are next to the cloth. Fold the cloth margins over the cardboard, creasing them well (see Fig. 3). Then remove

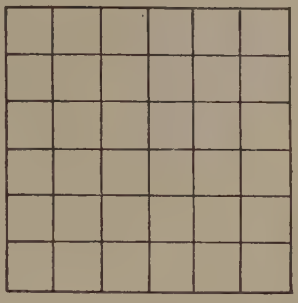
the cardboard, and cut away the small squares seen at each corner of the cloth (Fig. 4). Place the cardboard on the cloth again, ruled lines down. Fold the margins carefully, and paste them down (Fig. 5). The right side of your covered cardboard should look like Fig. 6. The ruled lines should show faintly through the cloth, so that you can use them as a guide in printing your design.

Cover the second piece of cardboard in the same way.



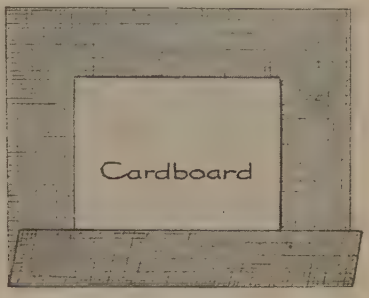
· Fig. 1 ·

3"x3" White Cardboard



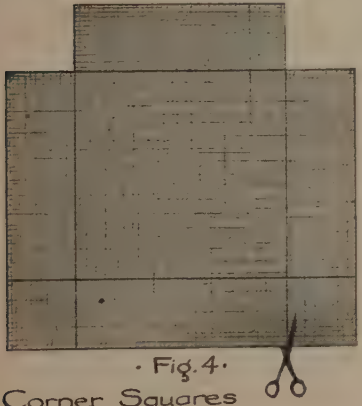
· Fig. 2 ·

Laid Off in Half Inches and Ruled in Full Lines



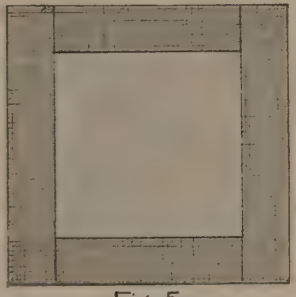
· Fig. 3 ·

Cardboard Placed on 5"x5" Stencillex and Margins Folded Over



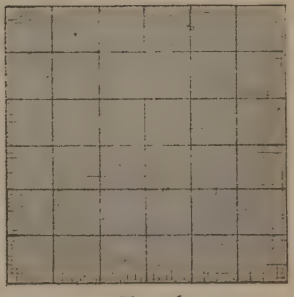
· Fig. 4 ·

Corner Squares Cut Out



· Fig. 5 ·

Margins Pasted Over Cardboard



· Fig. 6 ·

Face of Cardboard with Ruled Lines Showing Through Stencillex

PRINTING AN "ALL-OVER" PATTERN ON THE PIN-SQUARE

When we repeat a shape in one direction only, whether it is from left to right or up and down, we make a border. When we repeat a shape or a group of shapes in two directions—from left to right and also up and down—we make an "all-over" design, or surface pattern. Many wall-papers, silks, calicoes and other fabrics are decorated in this way.

We will plan an "all-over" pattern for our pin-square.

If your cardboards are covered with buff or gray silk or muslin, you can use almost any color in printing the design. But if the color is pink, or blue, or green, or violet, or red, you must be very careful in selecting the color you print upon it.

Green will go with pink; dark blue or orange with light blue; black will look well on red, and dark violet on light violet.

Mix your water colors or dyes carefully, and see that your color pads are well soaked.

Look at Fig. 1. The square is printed over the corners of the drawn square. This will give you an interesting "all-over" pattern. In Fig. 2 you see a circle printed in the middle of the square

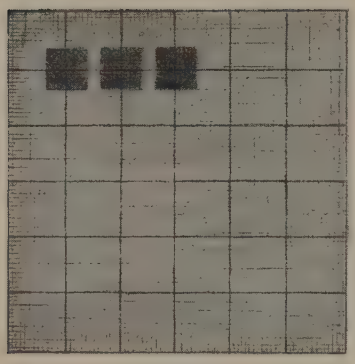


Fig. 1.

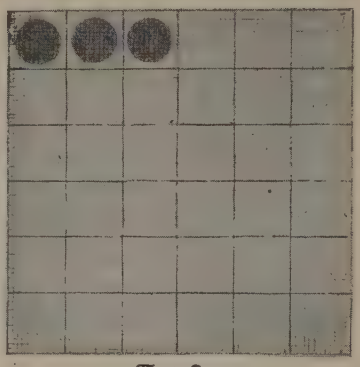


Fig. 2.

Process of Printing Front and Back of Pin Square

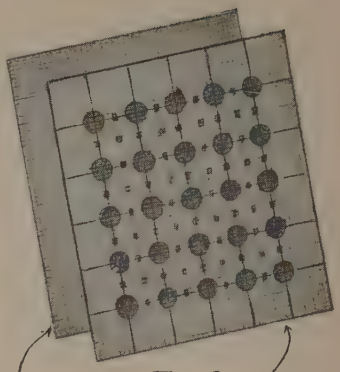


Fig. 3.

Back Cardboard Front Cardboard Ready for Pasting

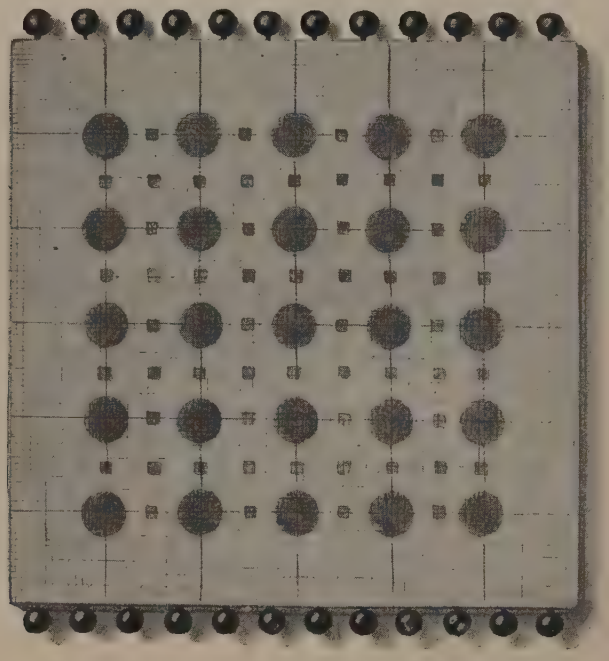


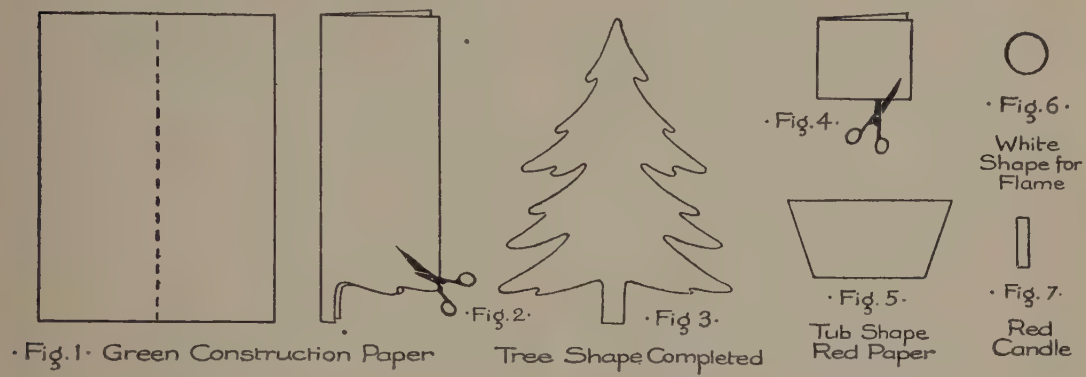
Fig. 4.

You have done this before. In Fig. 3 you see a smaller circle printed at the corners of the drawn square, with a tiny circle printed with the end of a match added. Choose any of these patterns, or invent one of your own. Print both of your covered squares. Then spread paste all over the under side of each cardboard, and press the two squares together. Put them under a heavy weight until they are thoroughly dry. Then stick pins in the edges, as shown in Fig. 4.

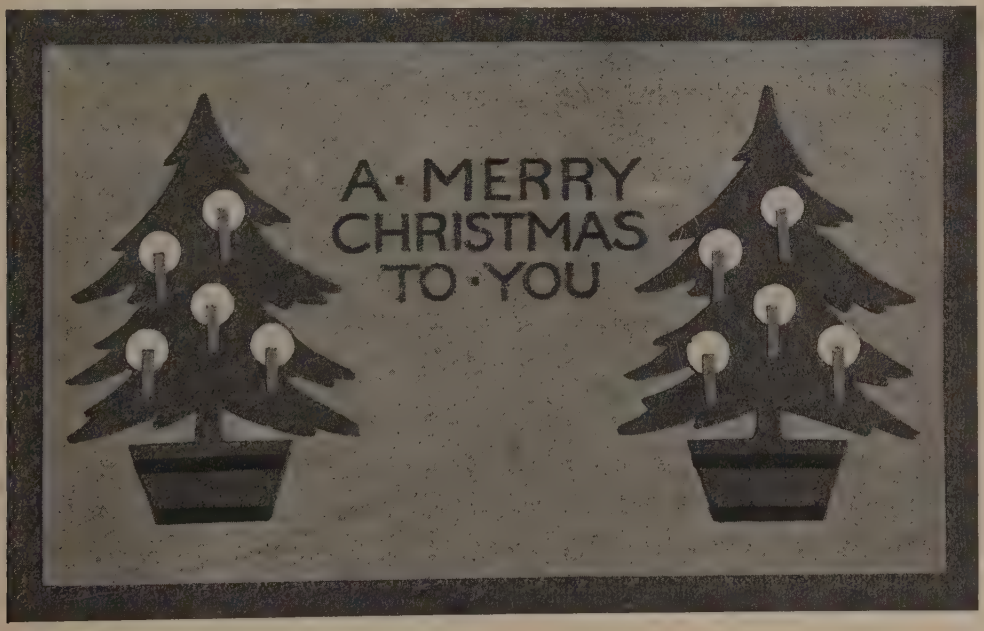
HOW TO DESIGN A CHRISTMAS CARD

At Christmas time we wish to send cards of greetings to our friends. Of course, we can buy these cards at any store, but how much more interesting it would be to design and make them ourselves! We have seen what charming decorations can be made by using shapes cut from colored papers. The Christmas card shown on next page was made in this way.

Cut a piece of white drawing paper the same size and shape of the card on this page. Fold a piece of green construction paper on its long diameter. Upon this folded paper cut one side of the tree shape (see Fig. 2). Unfold this piece of paper, and you will have the shape of the tree (see Fig. 3). Make two shapes like this. Cut a tub shape from red paper (see Figs. 4 and 5).



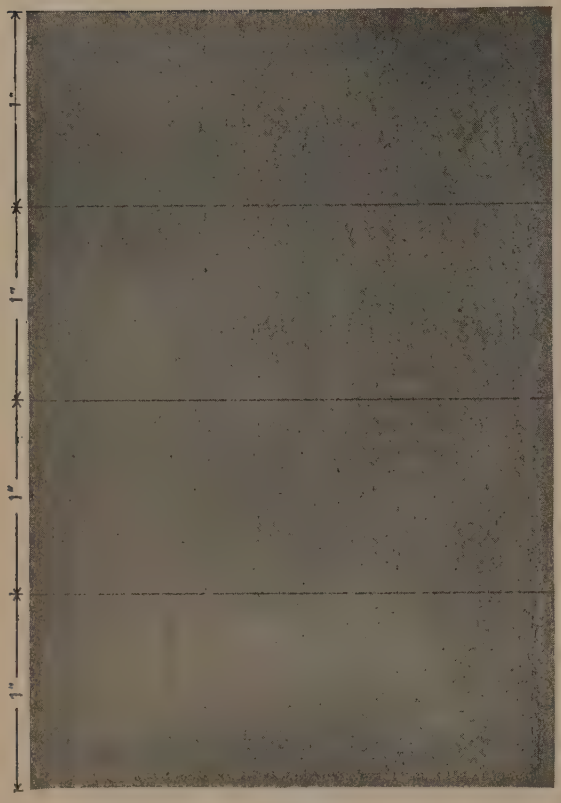
snip them to the proper length. Cut small articles of white or yellow paper to represent the flame of the candle. Paste these circles in place on the tree shapes, then paste the candles over and below them, as shown in the illustration. With a well-sharpened black crayon or pencil print "A Merry Christmas to You" between the tree shapes.



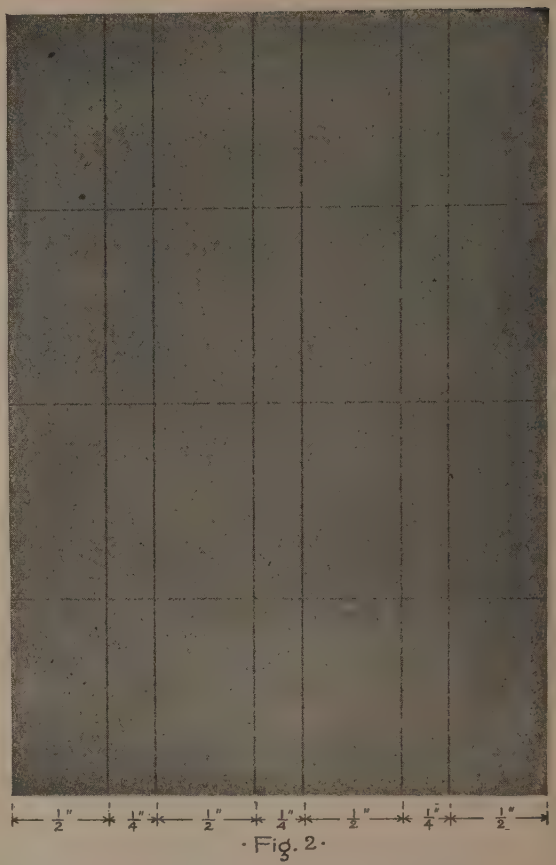
On each side of the card arrange the tree and tub shapes as shown in the illustration. Paste these neatly in place.

We are now ready to put candles on our trees. Cut narrow strips of red paper for candles, and

Other shapes could be used instead of the Christmas tree. You might use shapes of holly leaves and berries; shapes of toys; shapes of stockings; shapes of chimneys; shapes of bells, or the shape of Santa Claus.



· Fig. 1 ·



· Fig. 2 ·

4½" x 6" Colored Construction Paper · Ruled to Make Diagram for Stripe Pattern

PRINTING A STRIPE DESIGN

Many, many people earn their living by making designs for the various kinds of cloth that are manufactured. These people are called "textile" designers.

A textile is a fabric or cloth that is woven of cotton, wool or silk, or of mixtures of these materials. Millions of yards of these textiles are sold every year, and a large part of them are decorated in the same way. Often we see striped goods, in calico, percale, shirtings, silks, and many other fabrics.

Let us learn how to make a stripe design, and print it in colors.

You will need some sheets of colored construction paper for this work. It is supplied in packages of assorted colors, in nine by twelve sheets. Any school supply house can furnish it.

Choose a sheet that is light in tone; cut several pieces from it, each measuring 4½ by 6 inches. Place one of these pieces on the table before you, so that the long edges run from top to bottom. On the right and left edges set off inch spaces. Rule lines connecting these dots, as shown in Fig. 1 above.

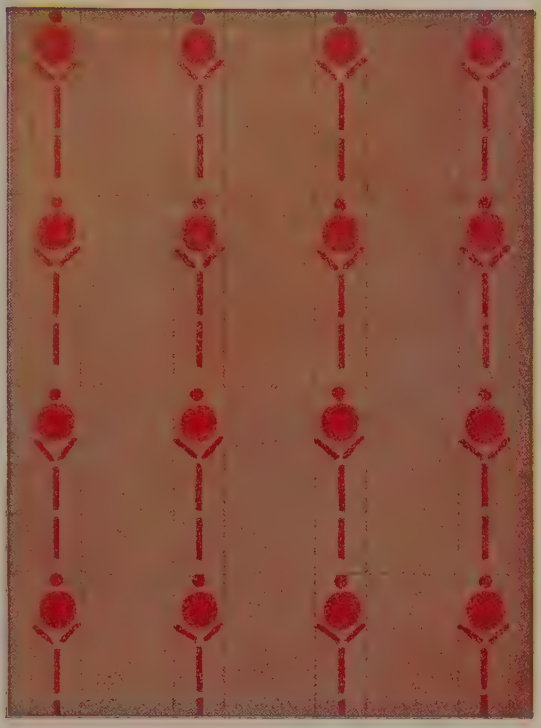
On the upper and lower edges, beginning at the left, set off alternate ½-inch and ¼-inch spaces. Rule vertical lines connecting these dots. Your paper should now look like Fig. 2.

We can print a vertical border in either the wide space or the narrow space. Either way will give us a stripe design.

In the two upper illustrations, accompanying colored plate, the blue design is printed in the wide space, and the red design in the narrow space. Both designs are good. The narrow, stem-like shapes were printed with the edge of a piece of cardboard.

DESIGNS STICK-PRINTED ON CLOTH

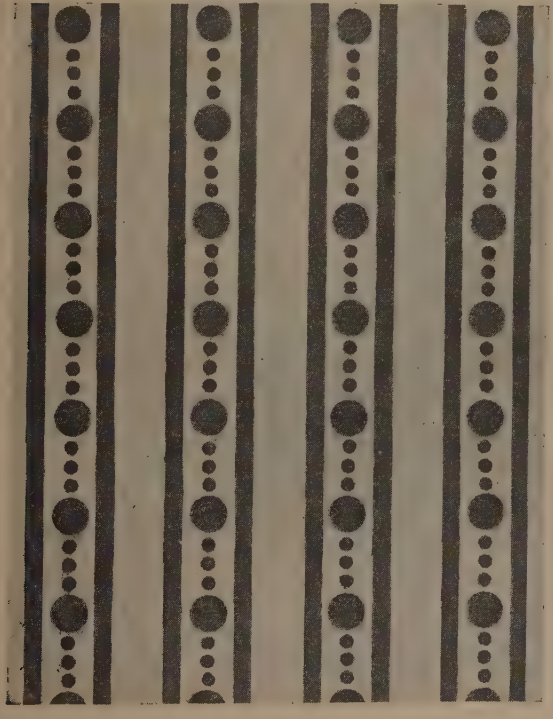
Mother's piece-box must again be ransacked for some scraps of gingham, percale, or any other



Stick Printed Striped Designs on Colored Paper

Stick Printed Striped Gingham

Stick Printed Striped Gingham Bag



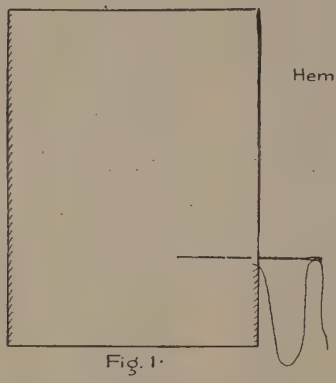
cotton goods that are woven or printed in stripes. The designs on page 49 were all printed with sticks on pieces of blue and white striped gingham. The heavy, vertical lines show the blue stripes in the cloth, and the circles, squares, dots, and horizontal lines show the shapes that were printed with the sticks.

The color of the stripes in your cloth should help you in selecting the color you will print with. In the blue striped gingham, blue and black, blue and orange, blue and green, and dark and light blue were used in printing the four designs. Just think of four such interesting and beautiful results, all obtained by printing on the same striped gingham!

It will be best for you to pin your cloth to a board, and to slip a piece of blotting-paper under your work. The blotting-paper will absorb the dye that might otherwise run and spoil your design.

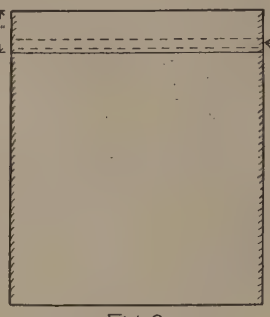
·Fig. 3·

8"x20" Striped Gingham Stick Printed for Bag



·Fig. 1·

Side Seams Overhanded



·Fig. 2·

The Wrong Side of the Bag

·Fig. 4·

The Duster-Bag Completed

A USE FOR OUR STICK-PRINTED GINGHAM

All the designs in the world would be of little value unless they could be used for something. Of course, we must practice our printing on paper and on scraps of cloth before we are ready to "make things." Practice makes perfect, you know. There are many ways in which we can use gingham which has been made interesting by the addition of stripe designs in color. One little girl made her mother some curtains for a bedroom which were much admired. Everyone wanted to know where the material could be bought, and the mother was very proud to say that her little daughter designed the stripe, and printed it upon ordinary blue-and-white gingham.

Fig. 3, in the illustration, shows a piece of stick-printed striped gingham, 8 by 20 inches in size. This strip is folded in the middle, and the sides overhanded together, as shown in Fig. 1. Fig. 2 shows the width of the hem at the top, and two rows of running stitch, which hold the hem down and also form a case for the draw-string. Fig. 4 shows the bag completed, with a narrow tape upon which some bright beads are strung used for a draw-string.

You might hem a square of cheese-cloth, and put in the bag for a duster. Any housekeeper would be glad of so useful and attractive a gift.

THE TRANSFORMATION OF A CRACKER BOX

How many empty Uneeda biscuit boxes do you suppose you have thrown away, without once thinking that they could be made into charming gift boxes? At Christmas time, especially, these

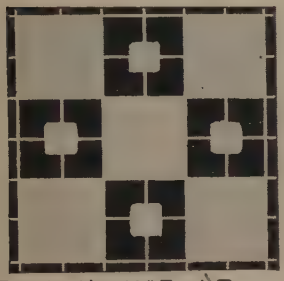


Fig. 1. 1½×1½" End Pieces Two Like This

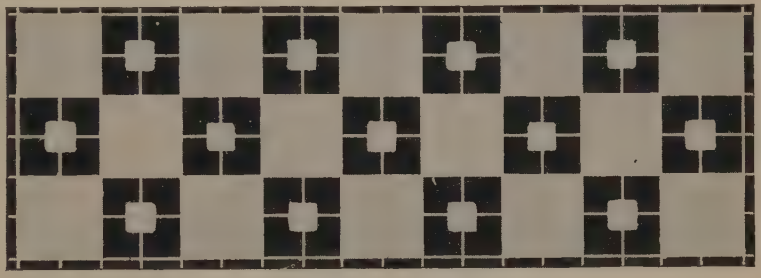
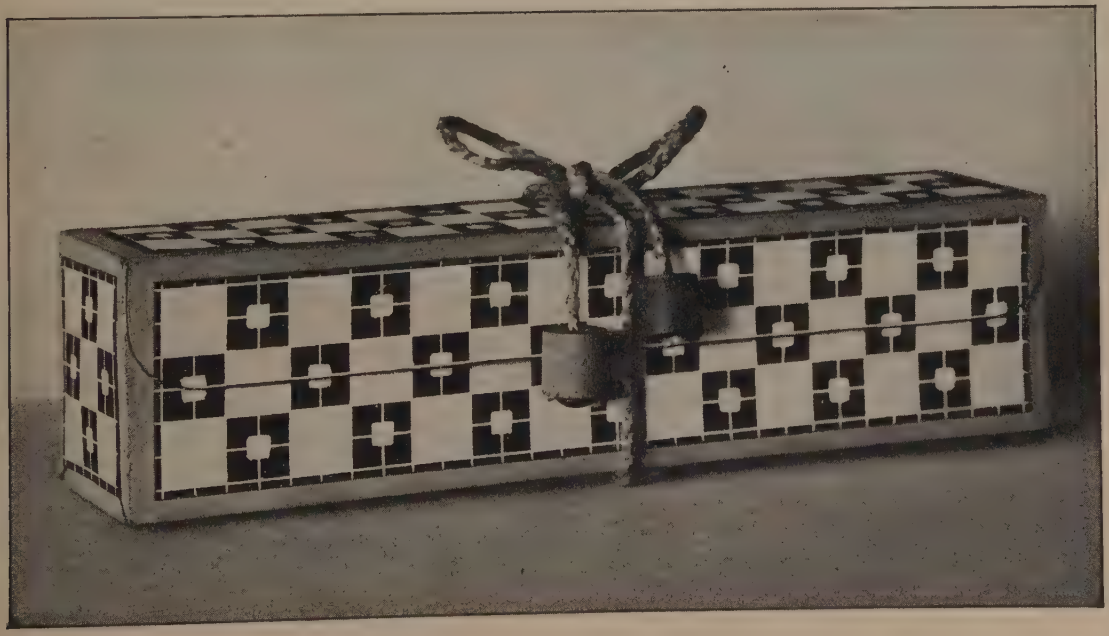
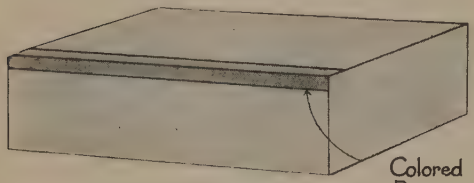


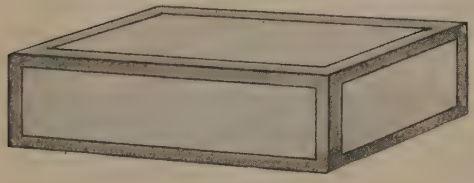
Fig. 2. Four Side Panels 1½×7½"



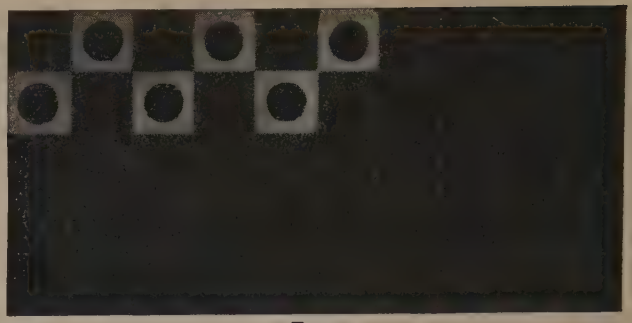
· Fig. 1 ·
Colored Paper One Inch Wide to be Pasted on Edges of Box



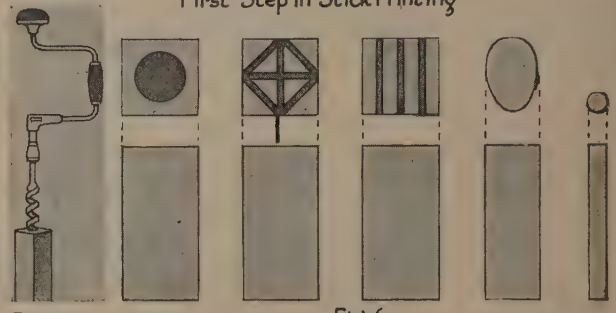
· Fig. 2 ·
· Colored Paper Pasted in Position



· Fig. 3 ·
All Edges Covered

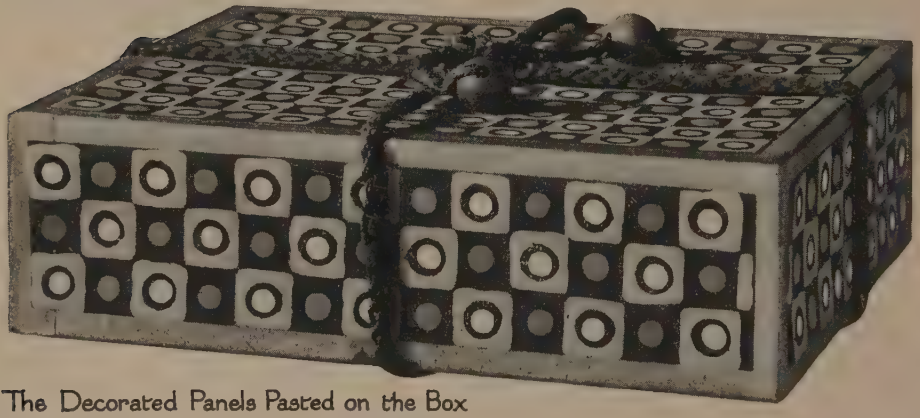


· Fig. 4 ·
Cover Paper Ruled in ½" Squares
First Step in Stick Printing



· Fig. 5 ·
Hole Bored in ½" Stick with ⅜" Bit

Fig. 6 ·
Front and Top Views of Modified Sticks



· Fig. 7 · The Decorated Panels Pasted on the Box

decorated biscuit boxes are just what we want to hold home-made candies, salted nuts, candied popcorn, small cakes and cookies, and many more of the goodies which the season suggests.

Ask your mother to save all the empty cracker boxes for you. You can make a gift for each member of the family, and no two need be alike.

Remove the labels and wrappings from a Uneeda biscuit box. You will find that it is made of strong gray cardboard. From light-colored construction paper cut 4 panels, each a ½ inch shorter and a ½ inch narrower than a side of your box. Rule each of these panels into ½-inch squares. Now, with your sticks and water colors, or dyes, print an "all-over" design on each panel. Make all the designs alike, for the same box. Fig. 2 gives you an idea of how your panels of paper shou!d look.

Cut 2 square pieces of your construction paper, a ½ inch smaller each way than the ends of the box. Rule these pieces into ½-inch squares. Print the same design upon them that you used on the panels (see Fig. 1). Paste each panel to the sides, top and bottom of the box, so that an even margin of the gray cardboard shows all around the panel. Paste the square pieces on the ends in the same way. Twist a cord and dye it to match your printing. Two "kindergarten" beads may also be dyed to match the cord, and fastened to the ends.

A TRANSFORMED STATIONERY BOX

Letter paper and envelopes are used by everybody, therefore it will be easy for you to obtain one of the strong, well-made boxes in which they are sold. These boxes are always of good proportion, and by using our knowledge of color and design, we can make them over into boxes that will be cherished for their own beauty, even if they contain nothing. When in addition they hold a fine bit of needlework, or something that we have selected with great care, they make a complete and most attractive gift.

The design that you see in the illustration is made with a "modified stick." Fig. 5 shows you the tool which has been used to bore the ⅜-inch hole in a ½-inch stick. This will print the shape that is used in Fig. 4. A three-cornered file was used to make the depressions shown in two of the designs in Fig. 6. The oval shape was made by whittling or filing the end of the stick. These are but a few of the many modifications that you can make on the ends of your sticks.

The edges of the box are first covered with strips of colored paper cut an inch wide and creased in the middle (see Figs. 1 and 2). These are pasted neatly in place, as shown in Fig. 3. Panels of colored construction paper are then cut ½ inch smaller in each dimension than the sides of the box. These panels are ruled in ½-inch squares and a shape printed in alternate squares with the modified stick (see Fig. 4). You can sometimes make the designs more interesting by printing a smaller shape in the open squares, or within a shape already printed. This was done in the box illustrated. The panels are then pasted neatly in place on the sides of the box, so that the margins of colored paper show evenly around them.

In the box illustrated a new kind of color was used in printing. This is sometimes called "show-card color," and is an opaque water-color, something like calcimine. These colors come in small bottles, and can be bought in almost any stationery store. By using show-card colors you can print light colors upon dark papers. You will notice in the box illustrated that light shapes were printed on black paper. Show-card colors must be thoroughly stirred until they are "creamy thick." Spread with a brush a little of the color upon a piece of cardboard, and dip your printing stick in this. You will greatly enjoy printing with show-card colors.

PAPER BOXES WITH CUT-PAPER DESIGNS

At the Christmas or Thanksgiving dinner we sometimes use "favors." A favor is a small gift or present for each guest. A little box of bright-colored paper made to hold nuts or candies will be just the thing for such an occasion.

The pattern for such a box is shown in Fig. 1. Cut two pieces of dark-green construction paper each 4 inches square. Rule a line 1 inch in from each edge on each square. Fold on these lines, creasing the fold well. The dotted lines in Fig. 1 show the folds, and the short full lines show where the paper is cut, so that the corners may be folded over and pasted. The top and bottom of the box are made just alike, except that in the top or cover thumb-holes are cut on two opposite sides, as shown in Fig. 2. These thumb-holes may be drawn by placing a penny in position and drawing around half of it. Four different ways of decorating the box are shown in Figs. 2, 3, 4 and 5. In Fig. 2, ¼-inch strips of light green paper were pasted across the top of a box to look like bands. At the crossing of these bands, ½-inch squares of the same paper were pasted. This completed the design. Fig. 3 shows the top of a box that was made of gray violet paper. Upon the top was pasted a 2-inch square of dark yellow paper, and upon this a 1-inch square of light yellow paper. Fig. 4 shows a stripe design of orange and black. The box was made of orange paper, and ¼-inch strips of black were pasted on the cover. Fig. 5 shows a design that looks quite like stick printing, but the border was made of oblong and circular shapes cut from colored paper.

Designing with cut paper is quite as interesting as stick printing. It prepares the way for painted designs, which come later.

A HALLOWE'EN FAVOR

The basket shown on page 55 can be used as a Hallowe'en favor. It may contain home-made

candies, popcorn, nuts, or small cakes. It is made of a 9-inch square of black construction paper, folded into 9 small squares, as shown in Fig. 1. The dotted lines show the creases, and the full lines show the cuts that must be made in order that the box may be folded and pasted to look like

OTHER CARDS OF GREETING MADE FROM CUT-PAPER SHAPES

We can cut from colored papers many landscape shapes which, when put together, suggest moonlight scenes, winter effects, or sunsets. We

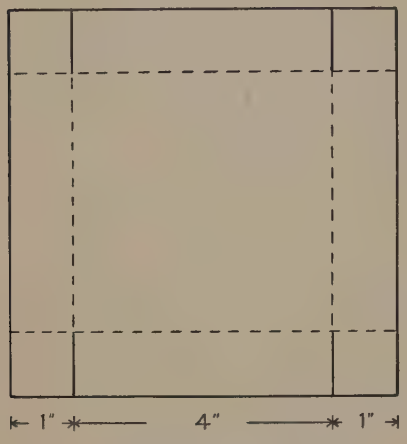


Fig. 1. Pattern of Box. Make Two Like This

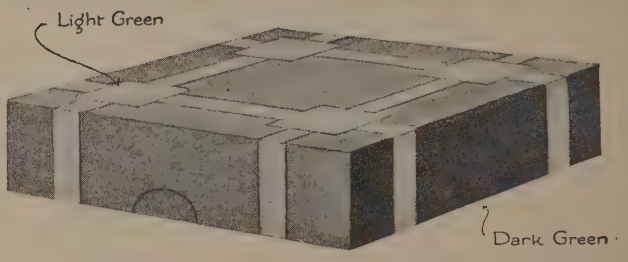


Fig. 2. Box Completed

Fig. 3. Arrangement of Squares

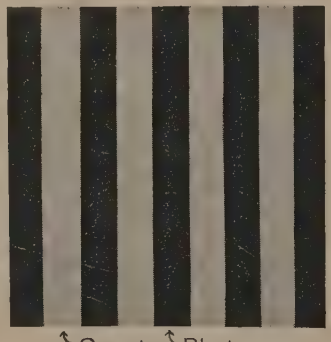


Fig. 4. Arrangement of Stripes

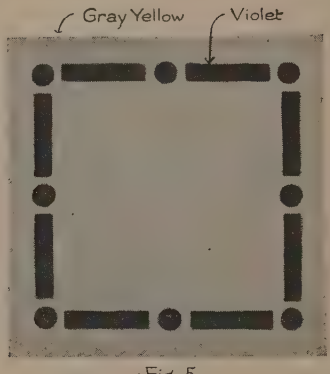


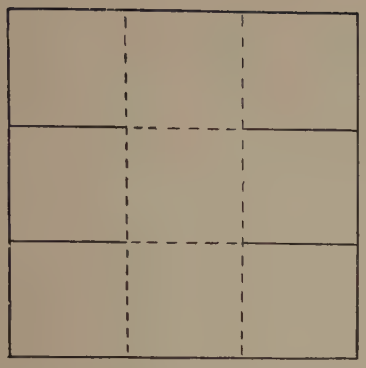
Fig. 5 Border Arrangement

Fig. 2. The two small squares, triangle, and oblong shown in Fig. 3, are cut from orange paper. These shapes are mounted on each side of the box, as shown in Fig. 9. They look a little like the eyes, nose and mouth of a jack-o'-lantern.

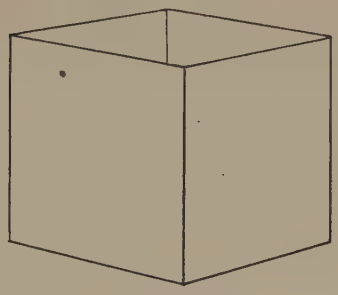
The handles of the basket look like chains, they are made of paper. Each link is made by folding and cutting, as shown in Figs. 4, 5, 6, 7 and 8. Cut all the links first; then slip a link folded lengthwise through a link folded crosswise. Paste the ends of the chains to the corners of the basket.

can also cut shapes of flowers. The illustrations give you several ideas for many cut-paper designs which can be used for cards of greeting.

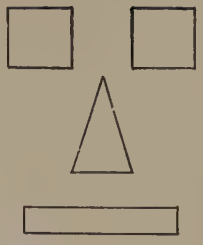
For Easter cards, use white paper with green letters, or green paper with white or yellow flower shapes. Daffodils, tulips, lilies, and hyacinths are all appropriate for Easter card designs. For Christmas cards, use dark green paper for trees. Make a snow-covered ground of white paper. Use dark blue paper for the sky, and orange paper for a moon. Make a snow-covered housetop from white paper, with chimney of red paper. The end of the house may also be of red paper.



·Fig. 1· 9" Square Black Construction Paper· Cut on Full Lines and Fold on Dash Lines



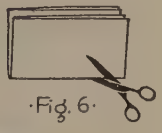
·Fig. 2·
Box Folded and Pasted



·Fig. 3·
Group of Shapes Cut from Orange Paper· Mounted on Each Side

·Fig. 4·
1"×2" Black Construction Paper Folded Twice

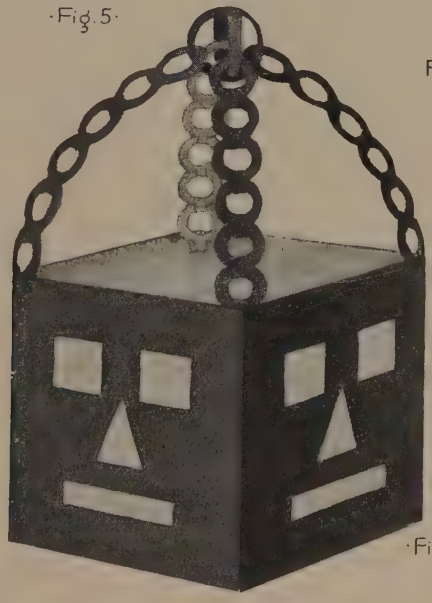
·Fig. 5·



·Fig. 6·

·Fig. 7·

·Fig. 8·
Free Cutting of Links



·Fig. 9

Arrange all these shapes on a white card, or heavy paper. Print your greeting with red, black, or green crayon.

HOW TO MAKE YOUR OWN CIRCUS

Own your own circus, and charge ten pins for a ticket of admission! You can give a wonderful performance, if you make all the things that are shown in this picture, together with many more which you have seen in a real circus. There are the clowns, the bareback riders, the trapeze performers, the ringmaster with his long whip, the jugglers, the kicking donkey, the trained elephants, and the monkey riding horseback.

For the making of the tent you will need 1½ yard of cheap white muslin, some ⅜-inch dowels, or round sticks, for poles, and a platform of thin

boards about 25 inches square. Holes must be bored in this platform for 9 tent poles, each 9 inches long, made from the dowels. In order to place these holes correctly, you will need to draw a circle on the platform. To do this, use a pin, string, and pencil. Drive the pin in the center of the board. Fasten one end of the string to this pin. At the other end of the string form a loop for the pencil point. The length of the string between the pin and the pencil point should be 12 inches. With this device draw a circle. On this circle locate 9 places for the tent poles. Bore holes with a ⅜-inch bit. A hole is bored at the center of the platform for the 19-inch center pole, also made of the dowels (see Fig. 6). Fit all the poles in the holes bored for them. Fig. 1 shows the roof of the tent made of a large circle of the muslin. This circle is 36 inches in diameter. About ⅛ of the circle is cut away (see Fig. 1). The edges of the muslin are cut in scallops, and the scallops are outlined with red crayon. The roof is then fitted around the center pole, and the edges tacked to the tops of the tent poles. A strip of muslin 9 inches wide and 42 inches long is tacked along one of the tent poles, stretched across the back of the tent, and tacked along the length of the fifth pole. This leaves four uncovered poles for the opening of the tent.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

A Circus

A flag should float from the top of the center pole. A sawdust ring for the animals to stand in completes the tent.

We are now ready to make cages for the animals.

CAGES FOR THE ANIMALS

On a piece of 9½ by 10-inch orange construction paper carefully lay out with ruler and pencil the diagram in Fig. 1 (page 59). All the dimensions that you will need are stated there. In the diagram, the dotted lines show where you are to fold, and the full lines where you are to cut. Fold the cage into shape and paste the laps. If you like you can leave the end of the cage open so that you can put different animals in it. Fig. 2 shows you how to cut four wheels, all alike. These may be made of block paper and pasted to the four corners of the cage as shown in Fig. 4.

The pattern for the driver's seat is shown in Fig. 3 (page 59). When you have cut it for one cage, use it for a pattern in cutting more cages for the other animals.

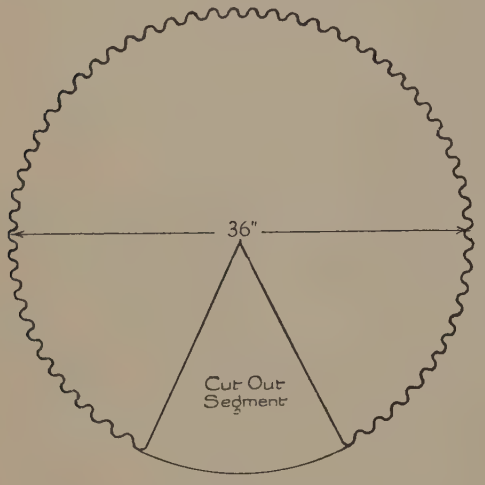
Now, as to the animals for the circus.

The pictures on page 60 are large enough for you to trace. Place thin white paper over them, and trace the shapes with a soft lead pencil. Cut out these traced shapes. Use them as patterns in cutting shapes from colored construction papers. Use gray paper for the elephant, yellow paper for the lion, cream manila paper for the giraffe, and orange paper for the tiger. Make the markings on the tiger and on the giraffe with brown crayon.

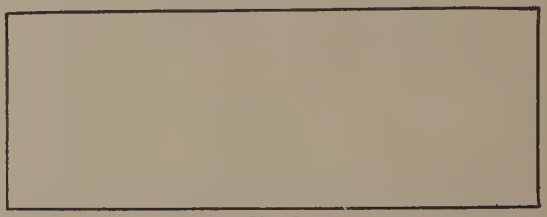
Cut out other animal shapes. A circus should show a camel, a leopard, a monkey, and a rhinoceros.

A DECORATIVE PLANT STICK

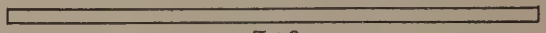
A plant stick may be ornamental as well as useful. Fig. 1 (page 61) shows a bird drawn on this cardboard. The shape is then cut out and colored with water-colors or colored crayons. No attempt is made to represent feathers, but all shapes are painted flat, as shown in the bird shapes on page 62. These shapes are large enough for you to trace and use as patterns for the decorations of your plant sticks. Fig. 2 (page 61) shows you a sharpened stick, split or cut at one end so that the bird shape may be inserted and fastened with a brad. This plant stick is to



· Fig. ·
Roof of Tent Made from Muslin Scallops Marked with Red Crayon

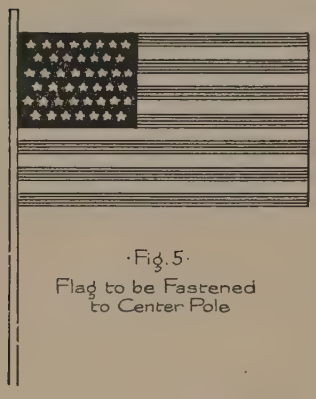


· Fig. 2 ·
Strip of Muslin 9"×42" for Wall of Tent



· Fig. 3 ·
Center Pole $\frac{3}{8}$" Dowel 19" Long

· Fig. 4 ·
Nine Poles for Side Wall 9" Long



· Fig. 5 ·
Flag to be Fastened to Center Pole

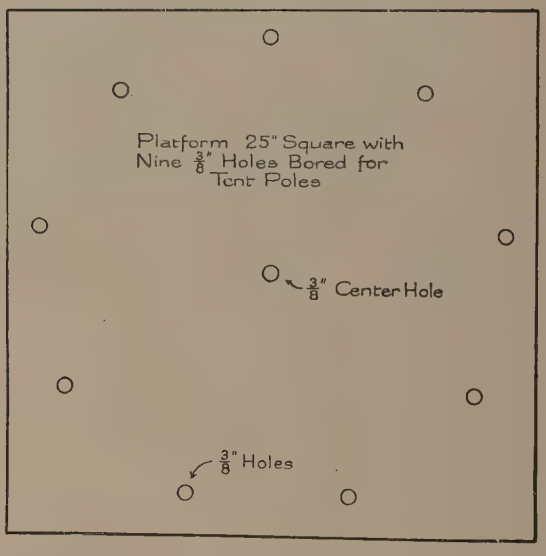
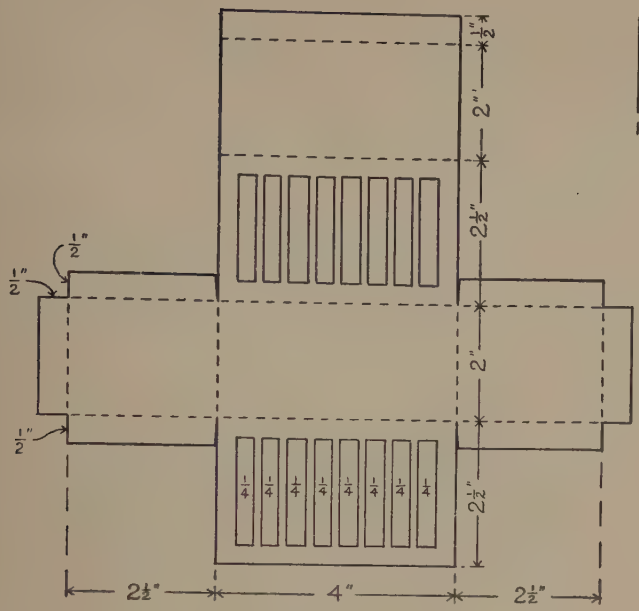
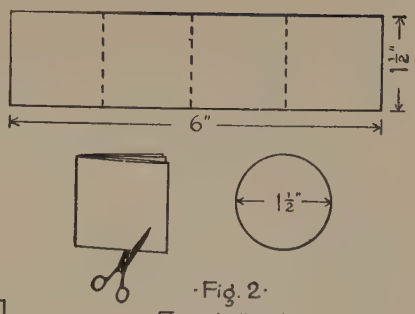


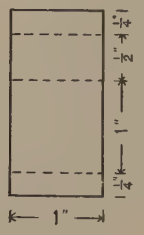
Fig 6



·Fig. 1·
9½"×10" Colored Construction Paper



·Fig. 2·
Four Wheels



·Fig. 3·
Driver's Seat

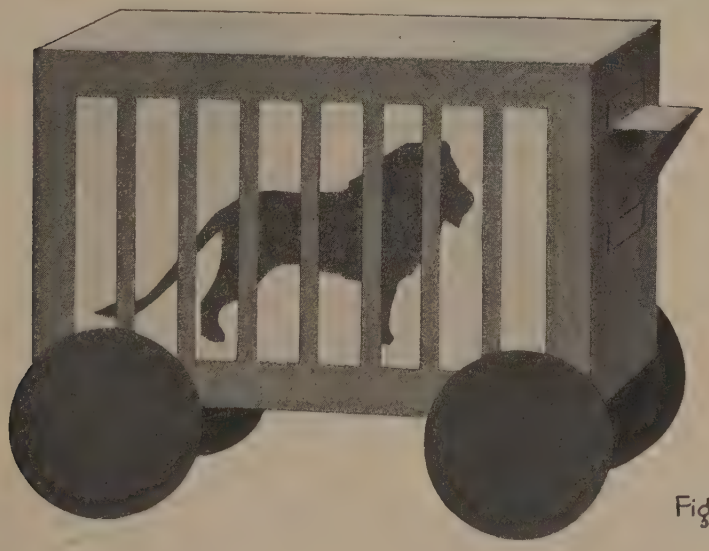


Fig. 4·

be used for house-plants (Fig. 5). The cardboard shape and the colors applied would not last out-of-doors.

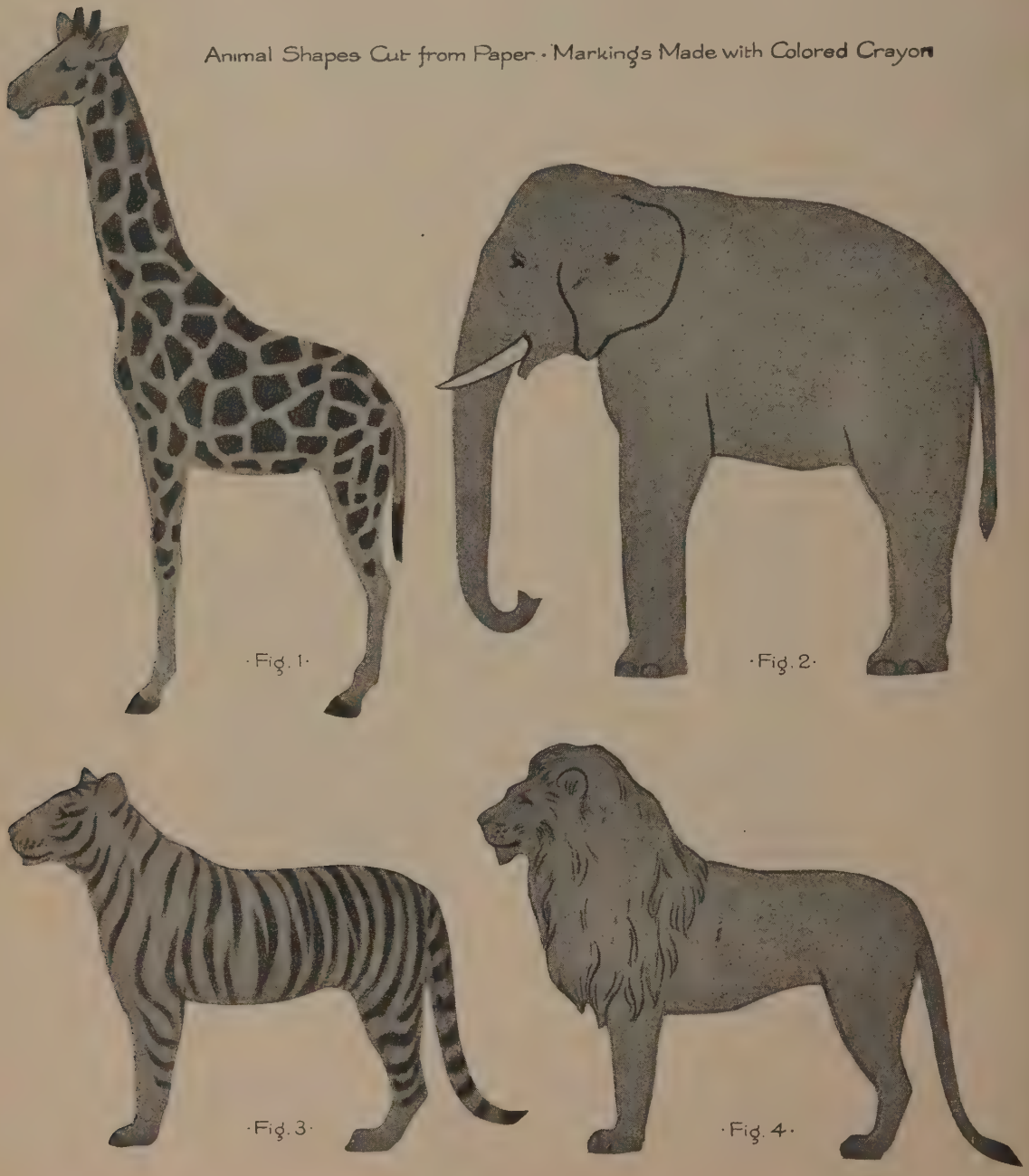
TO MAKE A BUTTERFLY KITE

A butterfly kite! Did you ever make one? All kites are interesting to make, and to look at as they float in the air; but a butterfly kite is the most beautiful of all.

You will need two pieces of No. 4 reed (such as is used in making baskets), each 13 inches long, and one piece 10 inches long. In the two 13-inch pieces, make a ½-inch slit 4 inches from the end. If you soak the reeds in water for about

10 minutes you will find it easy to make the slits. Fig. 3 in the illustrations shows you how to slip the 10-inch reed through the slits in the long reeds. Fig. 4 shows you how to bind the reeds together with small cord. Fig. 5 shows a cord secured by winding and tying to each end of the reeds. This makes a frame for the kite. This framework is then laid over a piece of manila paper cut 11 by 14 inches (Fig. 6). The margins of paper are folded over the cord and pasted down.

The decorations, Figs. 1, 2 and 3 (page 64),



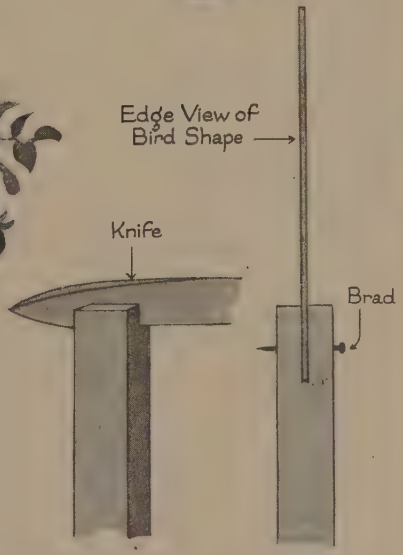
show some beautiful shapes, from actual butterflies. In decorating your kite, you can use these, or you can work from butterflies in some collection.

First: Prepare a piece of manila paper, the same size and shape as your kite, fold this shape on its vertical axis, as in Fig. 4 (page 64). On one side of this axis, draw the shapes seen on one-half of any butterfly you may select. The shapes may be modified or changed to fit the spaces on the kite. Notice that the shapes are separated from each other, in all the butterfly

·Fig. 1·
The Bird Shape Drawn on Cardboard

· Blue Jay ·

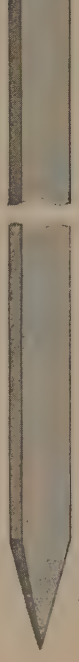
Fig. 5·
The Plant Stick in Use



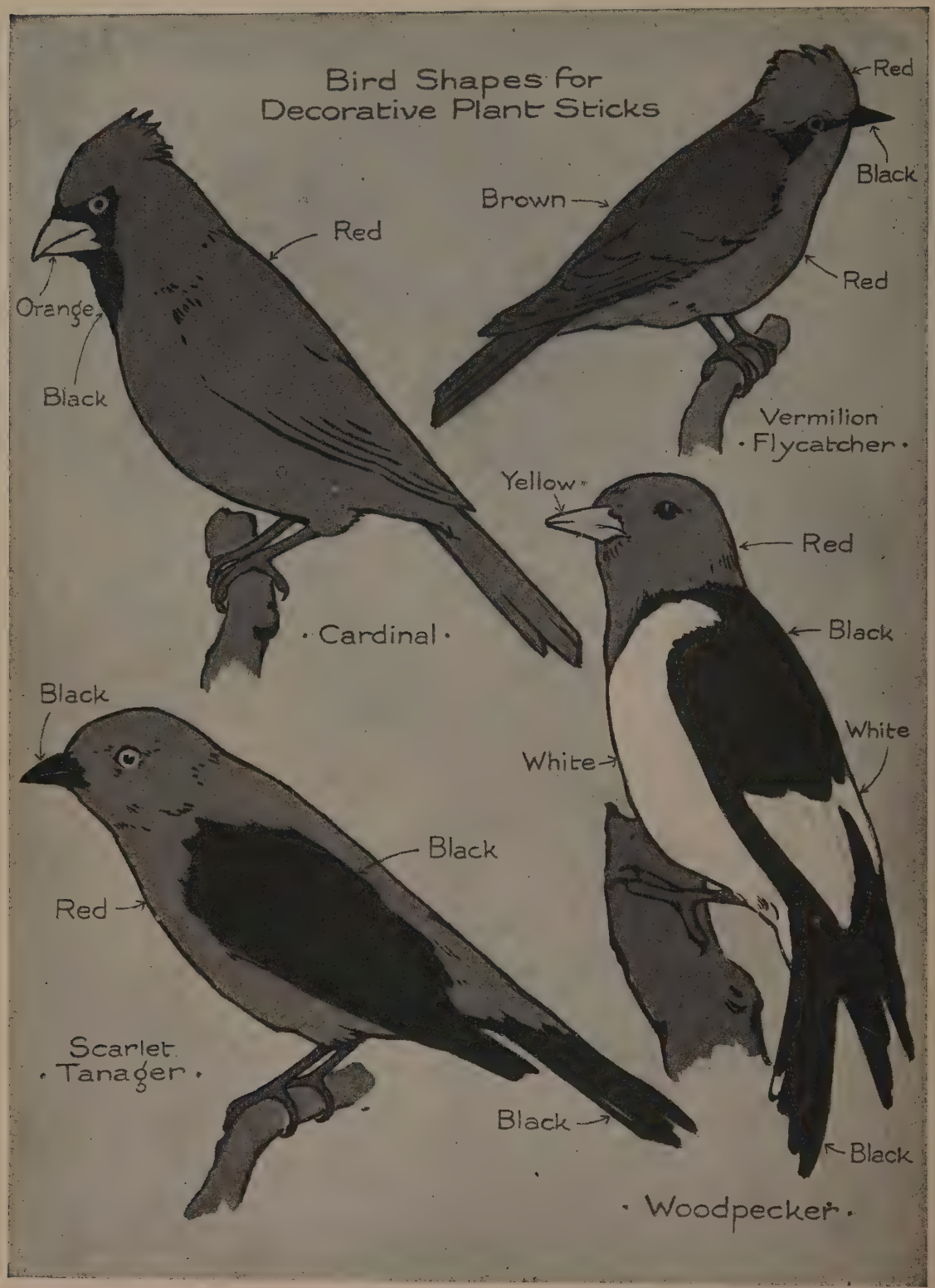
· Fig. 2·

· Fig. 3·

End of Stick Split for Insertion of Bird Shape



·Fig. 4·
The Plant Stick Completed


Bird Shapes for
Decorative Plant Sticks
Red
Black
Brown
Red
Vermilion
· Flycatcher ·
Red
Orange
Black
· Cardinal ·
Yellow
Red
Black
White
White
Black
Red
Black
Scarlet
· Tanager ·
Black
Black
· Woodpecker ·

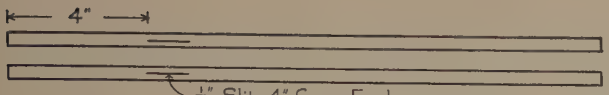


Fig. 1.
Two 13" Pieces of No. 4 Reed

Fig. 2
One 10" Piece of No. 4 Reed for Cross-piece

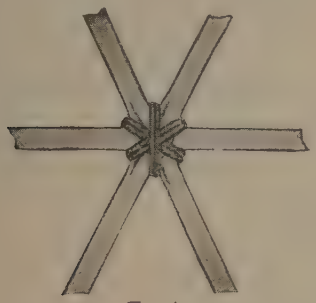


Fig. 4.
Detail Showing Reeds Tied with Cord

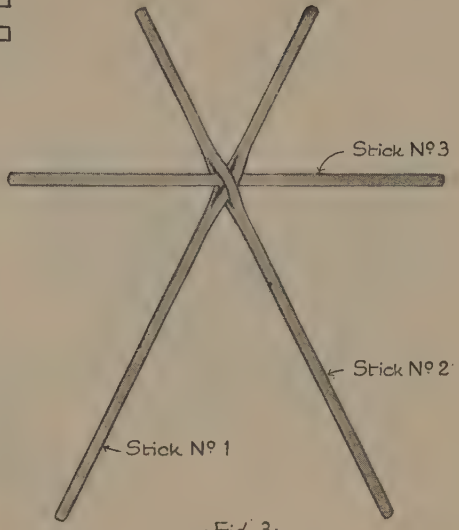


Fig. 3.
No. 1 Pushed Thru Slit in No. 2
No. 3 Pushed Thru Slits in No. 1 and No. 2

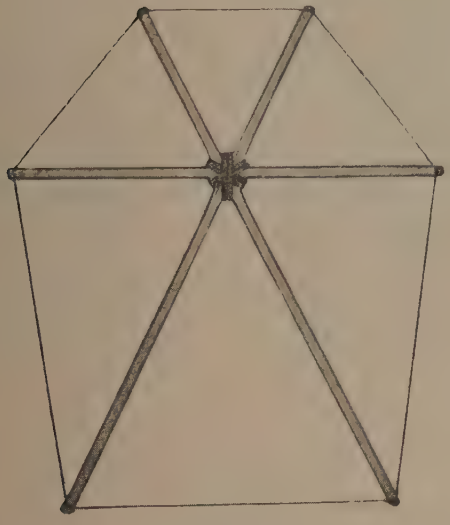


Fig. 5.
Cord Tied to Ends of Reeds

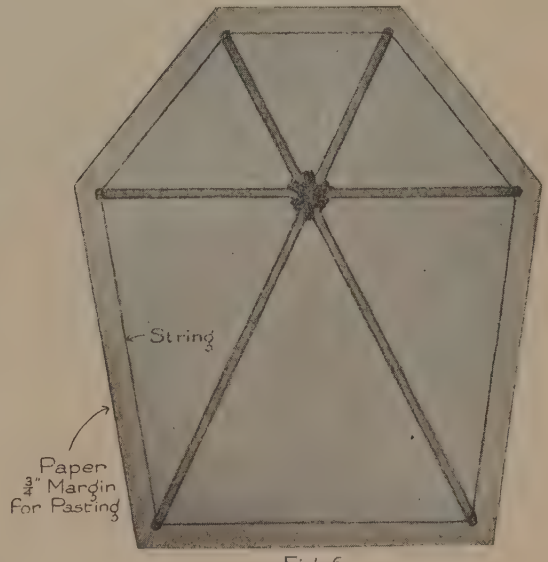


Fig. 6
11x14" Manila Paper to Cover Kite

motives on that page. Draw your shapes in the same way. When half of your butterfly is drawn, cut out the shapes, as shown in Fig. 5 (page 64). Fold your paper again on the axis, and trace all the shapes on the opposite side. Cut out the openings on this side. You now have a stencil pattern, which may be used not only once, but many times, in tracing the butterfly shape. Lay the stencil on your kite. Trace the shapes. Fill them in with bright, opaque water-colors, or with tones of colored crayon.

FINISHING THE KITE

Instead of painting the decorations on your kite, you can cut butterfly shapes from colored papers and paste them in place. This has been

done in Fig. 4, shown on page 65. The dark shapes were traced by using the stencil pattern placed over dark-brown paper. The oval shapes at the top were cut from orange paper, and the Stay-strings are fastened to opposite points of the kite, and a flying-string is tied where they cross.

All we need now is a good breeze! Our kite looks like a big butterfly!

· Fig. 1 ·

· Fig. 2 ·

· Fig. 3 ·

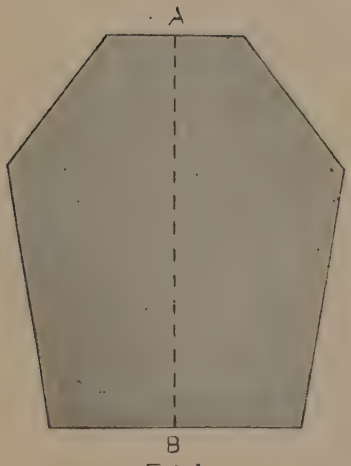
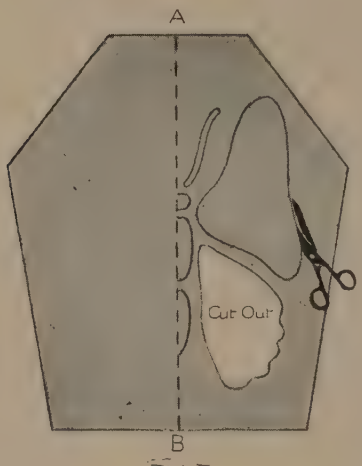


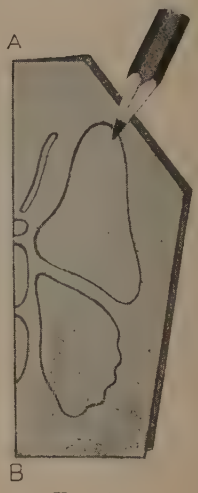
Fig. 4

Kite Shape Traced and Cut from 11x14" Manila Paper and Folded on Axis A-B



· Fig. 5 ·

Half of Butterfly Shape Drawn and Parts Cut Out



· Fig. 6 ·

Kite Shape Folded on Axis and Openings Traced on Opposite Half

DECORATIONS FOR KITE

small white shapes were cut from white paper. You can make many other butterfly arrangements by using shapes cut from colored papers.

Your kite will not be complete without a tail. Cut some pieces of manila paper 4½ by 6 inches (Fig. 1, page 65). Roll these and tie them around the middle with the long string that you have provided for the tail (Fig. 2). The paper rolls should be spaced the same distance apart, and a paper tassel should finish the tail (Fig. 3).

AN EASY WAY TO DRAW FLOWERS

With white chalk, a box of colored crayons, and some sheets of gray paper, we can draw many of the beautiful spring flowers.

A white tulip will be a good flower to draw first.

Try to get the flower itself, and draw from that, instead of copying the tulip.

First, see that your chalk is well sharpened.

It should have a long, slender point, and your crayons should be sharpened, too.

Cut a panel of gray paper, about 4 inches wide and 9 inches long. Near the top of this panel draw the shape of the tulip blossom. Fill in this shape with long strokes of chalk, slightly curved outward. Allow a little of the gray paper to show through the strokes. Then with green crayon draw the stem. Study carefully the shape of the leaves, and draw them in outline first. Fill in the shapes with strokes of green crayon, running the long way of the leaves. Study the picture of the tulip. You can see which way the crayon strokes are drawn. The gray paper should show a little through the strokes.

Draw from any other white flower, using gray paper as a background.

HOW TO DRAW PANSIES

When we see boxes of pansies in the florists' windows, we know that Spring has come. A basket or box of these beautiful flowers will be a good drawing model. Cream manila paper, white chalk, and colored crayons with well-sharpened ends are the materials you will need.

Fig. 1 (page 67) shows how a chalk sketch of a pansy should look. Fig. 2 shows the shape filled in with strokes of white. This is to be done, no matter what color the pansy is. The color is added next. Fig. 3 shows part of the color laid on over the chalk, with strokes of colored crayon. Fig. 4 shows how a single pansy blossom should look, when all the color is added over the white chalk.

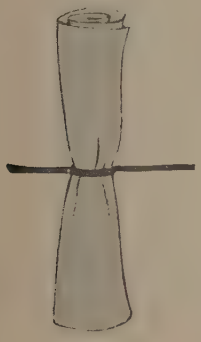
If you wish to draw the basket, too, sketch it first in outline. Fill in the shape with white chalk strokes. Then over this add strokes of yellow and brown crayon, until you have the color of wood.

Try to draw a basket filled with pansies.

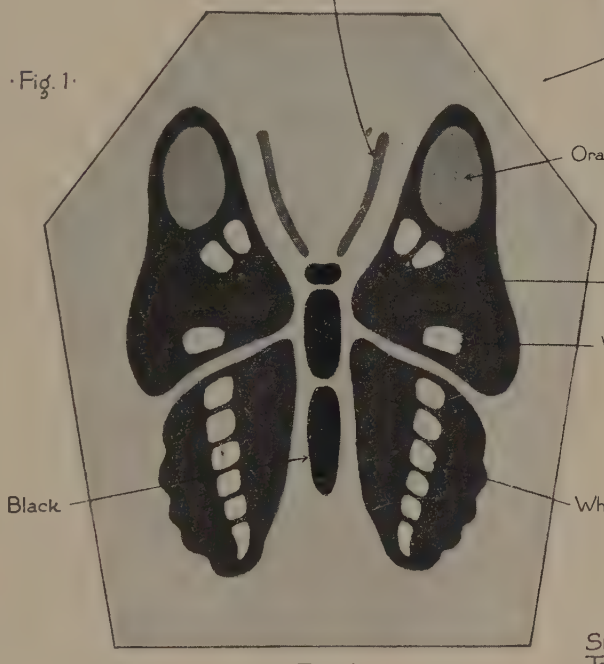
There is a capital opportunity in this exercise for a display of your talent.

4½x6" Manila Paper Rolled to Make Section of Tail

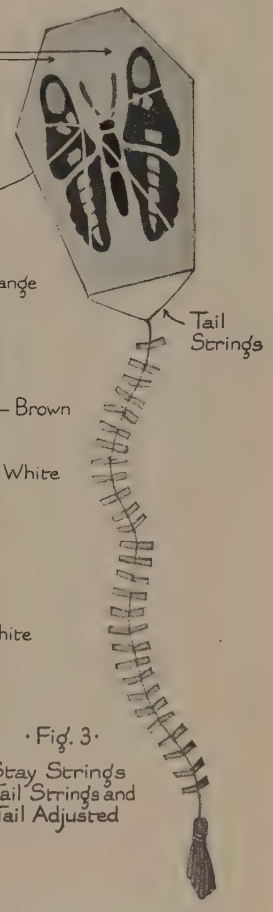
· Fig. 1 ·



· Fig. 2 ·
Tail Section Tied



· Fig. 4 ·
Cut Paper Decoration
· Butterfly Motif ·



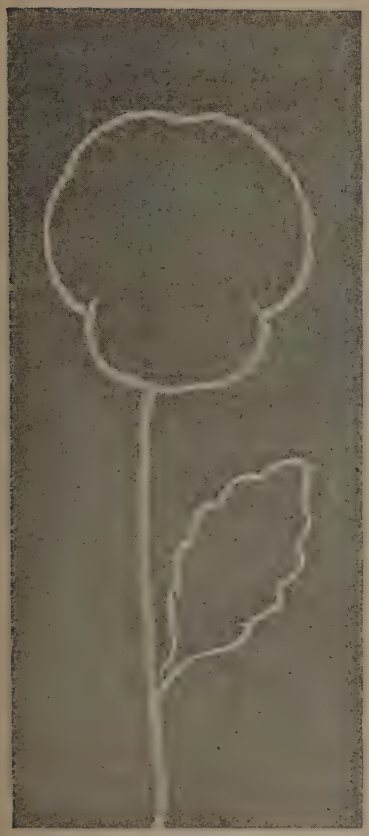
· Fig. 3 ·
Stay Strings Tail Strings and Tail Adjusted

·Tulip·

·Hyacinth·

DRAWINGS OF TOYS

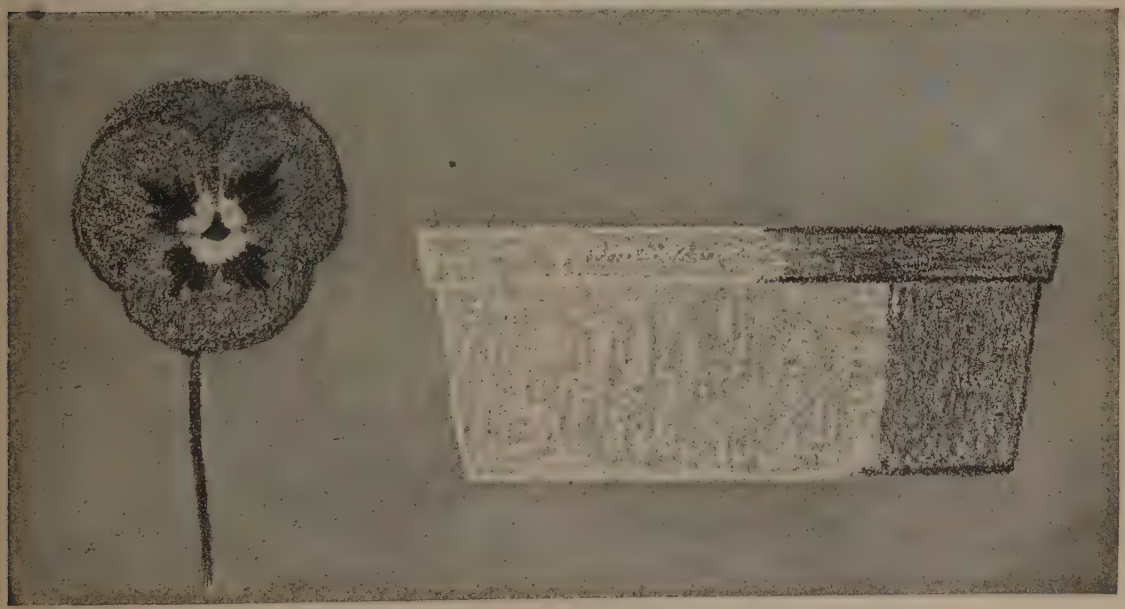
These drawings of toys are made on gray paper, with white chalk, black and colored crayons. All the shapes are first drawn in outline, then filled in with strokes of white chalk and black crayon. The Teddy Bear (page 68) , was drawn all in white, with orange bow. The soldier had a red coat, and the donkey a green saddle-cloth. Select toys of your own that show contrasts of light and dark, with a spot of color. A rocking-horse or a toy boat would make a fine sketch. Keep your chalk and your crayons well sharpened. Under each drawing, print neatly the name of the toy. You will find a good alphabet on page 75.



· Fig. 1 · White Chalk Outline on Cream Manila

Fig. 2 · Outline Filled in with White Chalk

· Fig. 3 · Crayon Strokes Added to Express Color

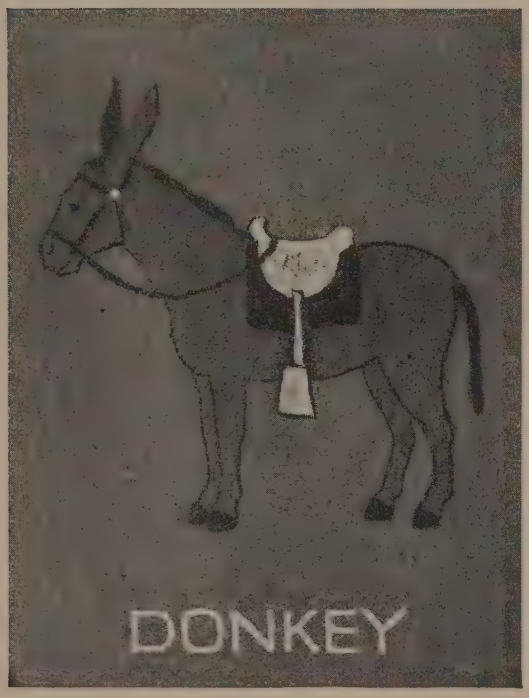


· Fig. 4 · Pansy Completed

· Fig. 5 · Method of Drawing Basket

BEAR

SOLDIER


DONKEY

COW

Fig 1.

Fig. 2.

Fig. 3.

PICTURES TO DRAW AT EASTER TIME

A downy chick, a black and white rabbit, and a yellow daffodil! Have you seen all three of these beautiful things? What fun it would be, if you could sketch a little chick or a rabbit "from life"!

Use gray paper for a background. With white chalk draw the shape of the chick in outline. Fill in the shape with chalk strokes, then add strokes of yellow crayon over these strokes. Draw a yellow bill, a bright black eye and yellow legs and feet. How many toes has a chick?

Draw the shape of the rabbit with white chalk. Fill in the white parts first. Then with black crayon strokes fill in the black parts. What color is the rabbit's eye?

Now draw the daffodil. Choose a narrow piece of paper for this. Draw all the shapes first in white outline. Then draw the yellow flower, the long, slender stem and the narrow leaves.

These are all good exercises.

MORE DRAWINGS FROM TOYS

Toy wheelbarrows, wagons, carts, and automobiles are excellent models for drawing. They are interesting in shape, and they are nearly always painted in bright colors.

Use gray paper, white chalk, black crayon, and colored crayons. Draw the shapes first in white chalk outlines, trying to show the true proportions of all the parts. Then line in all shapes with sharp, even lines of black crayon. Lay strokes of colored crayon over the shapes that are to be shown in color. Make drawings from other toys not shown in the illustrations.

A POSTER TO ADVERTISE TOYS

This poster was made entirely from cut-paper shapes. First the shape of the toy taxi-cab was

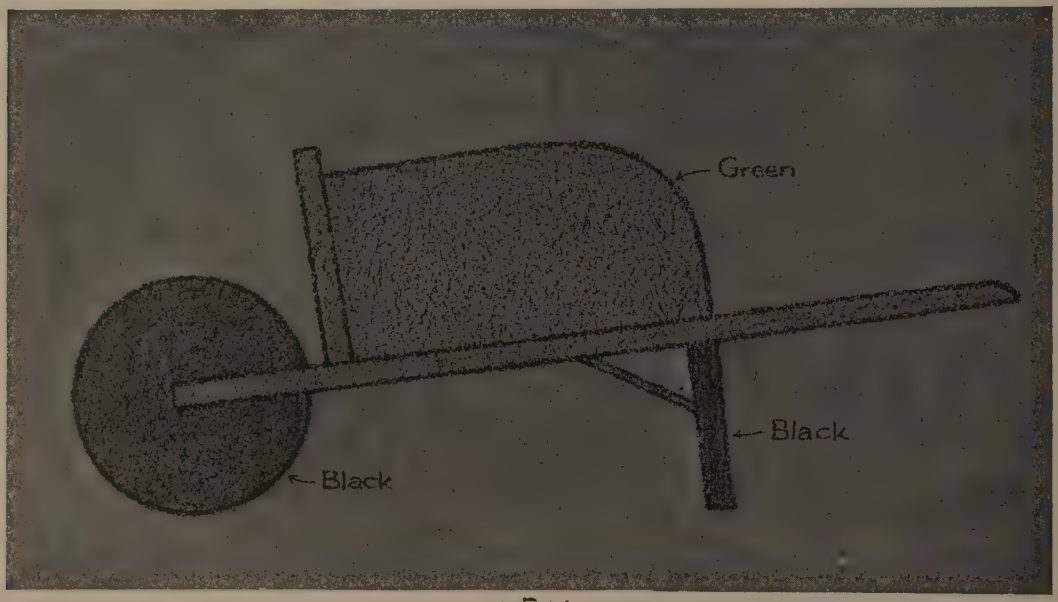


Fig. 1.

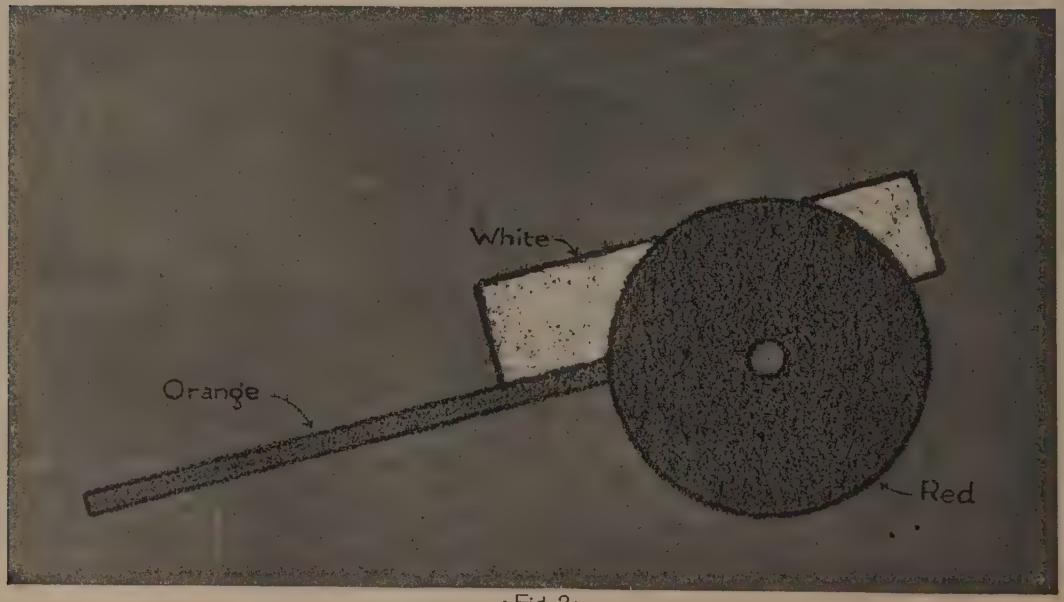
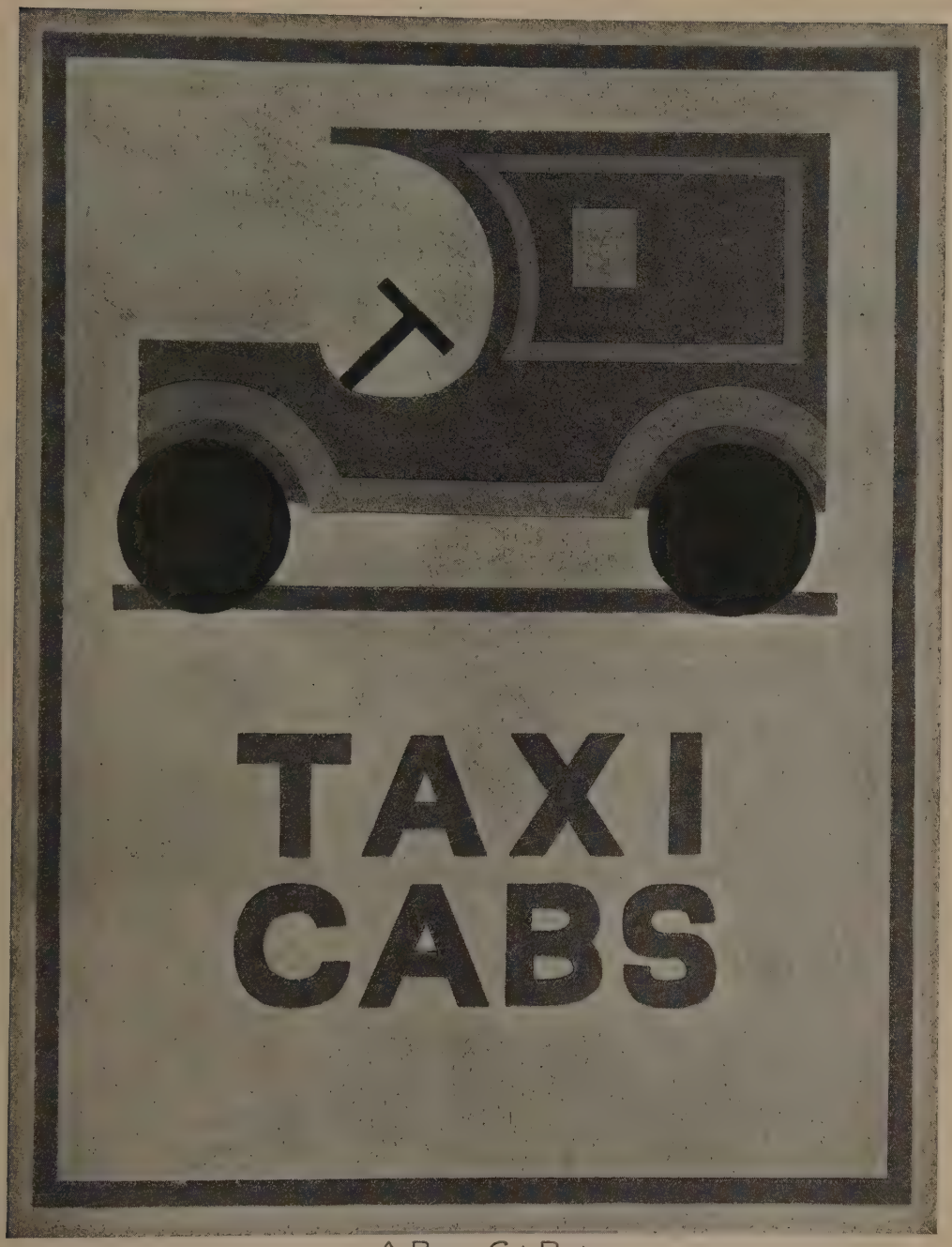
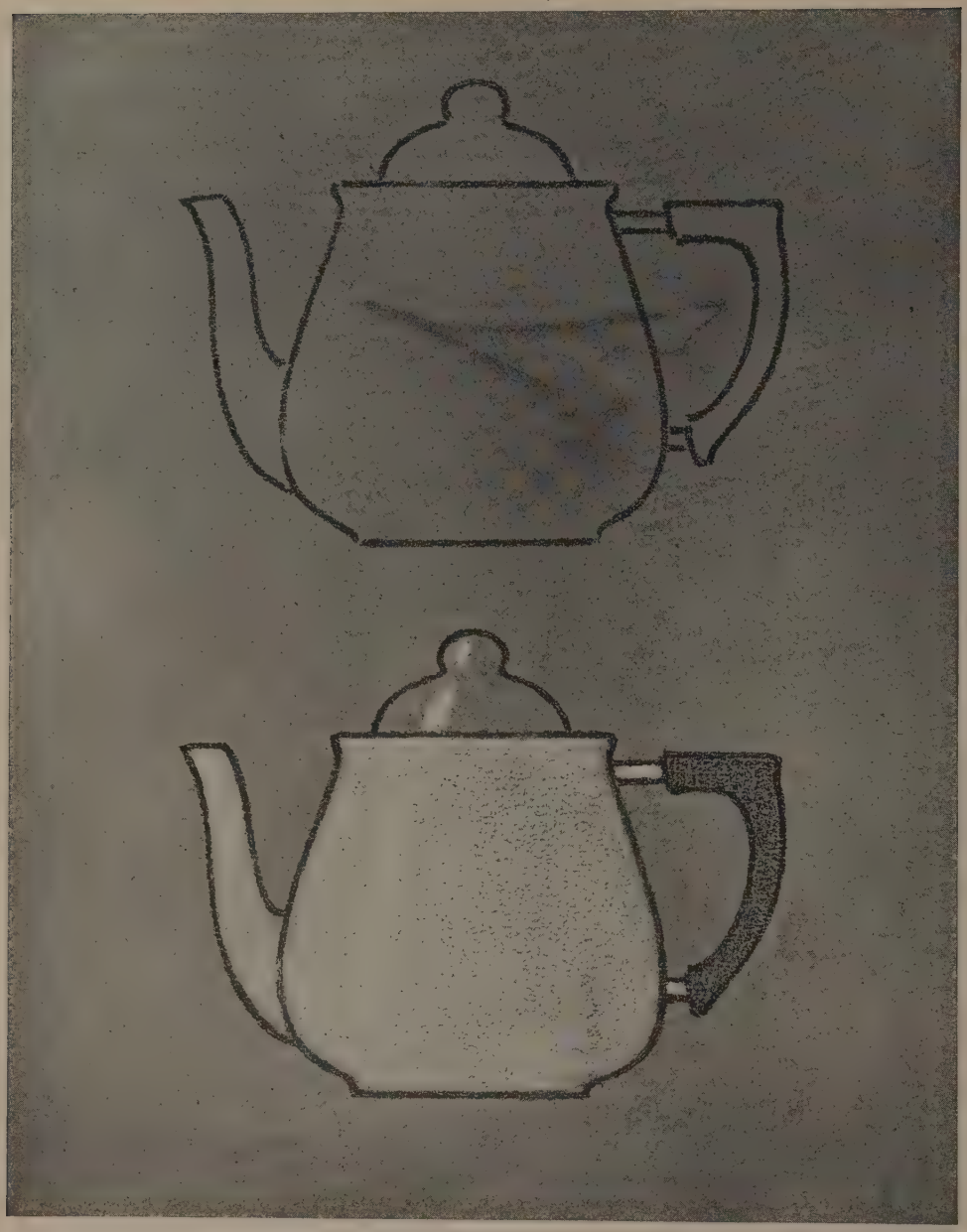


Fig. 2.



A Paper Cut Poster

drawn on manila paper and cut out to serve as a pattern. This was laid on a piece of green construction paper, and a tracing made around it. The green shape was then cut out. Bands of yellow paper were drawn, cut, and pasted on for decorations, as shown in the illustration. The shape of the window was also cut from yellow paper, and pasted in place. Then the taxi-cab shape was placed near the top of a 9 by 12 sheet of gray paper and pasted down. The wheels and



steering gear were cut from black paper and pasted in place.

The letters in "Taxi cabs" were cut from black paper. A long strip of black paper, 1 inch wide, was first cut, and the letters drawn on that, making them all 1 inch high. They were then cut out, carefully spaced, and pasted on the poster.

A marginal band of dark-green paper, ¼ inch wide, was then cut and pasted ½ inch from the edges of the gray paper.

A DRAWING OF A COFFEE-POT

Many of the common articles we use about the house, especially the cooking utensils, make excellent models to draw from. The coffee-pot shown in the illustration was made of aluminum. It was shining bright, like new silver. Gray paper, white chalk, and black crayon were used in making the sketch. The shape is beautiful, and practical as well, for it is larger at the bot-

tom than at the top, so that it will not be easily upset.

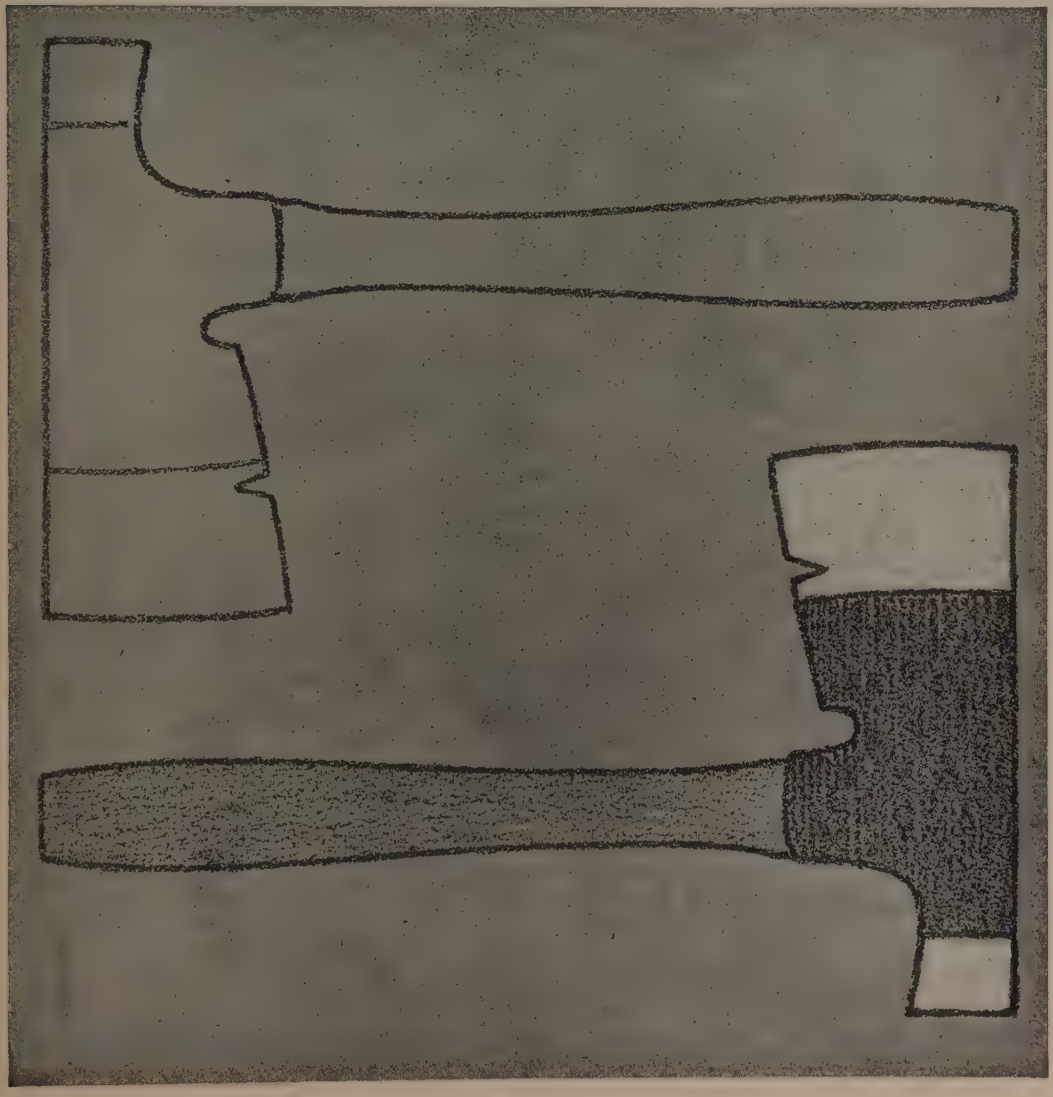
Make similar drawings from other aluminum or tin cooking utensils. Try for truthful shapes, large sizes, and well drawn outlines.

DRAWING FROM TOOLS

Have you noticed the tools and other things displayed for sale in a hardware store? How fresh and new everything looks, how useful each article is, and how the steel and other metals shine! Tools are really beautiful, and we should learn their uses, and how to take care of them.

A bright, new hatchet, with its well-modeled handle, is something that everyone likes. To draw the head of the hatchet will take careful study, for it is not as simple as it looks.

Fold a sheet of 9 by 12 gray manila paper on its long diameter. Tear the two halves apart. Plan your drawing on one of these halves. First draw the hatchet's head, beginning with the left vertical edge. Carefully study the length of each straight line and direction of each curve. Make light lines, with chalk, so that you can easily correct errors. Draw the curve of the handle, when all parts are drawn correctly. Make the outline heavy and even, with black crayon. Make the handle yellow, the bright steel white, and the



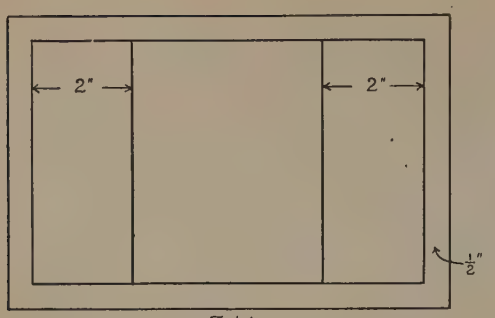


Fig. 1.
6×9" Gray Manila Devided into Three Spaces · · ½" Marginal Lines Drawn in Black Crayon

Fig. 2.
Shape of Hammer Drawn and Cut Out for Pattern · ·

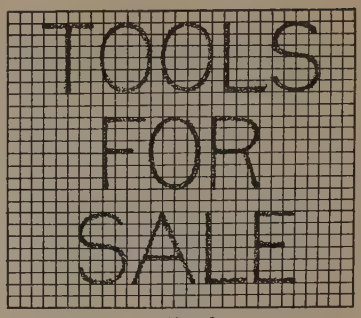


Fig. 3.
Letters Planned and Spaced on ⅛" Squared Paper · ·

painted section orange. You will have a fine color scheme.

A SHOW CARD FOR A HARDWARE STORE

Show cards are something like posters. They are intended to attract attention, and to advertise some particular article for sale.

The small sketches on this page show you how to plan a card of this kind. Measurements are given in Fig. 1 for the card, and for the divisions containing the tool shapes and the lettering. Fig. 2 shows you how to cut a pattern of some tool, to be used as a decoration for the card. This pattern is laid against the background in the two side spaces, and a tracing made around it. The shapes are then filled in with black and colored crayons. An enclosing line of black, drawn a short distance from the outline of the tool, will give a decorative effect. • Fig. 3 shows that the letters are first drawn on squared paper. Soft lead, from a pencil, is then nibbed over the back of the paper. This nibbed surface is placed next to the gray paper of the card, and the letters traced with a hard pencil. They are afterward lined in with a well-sharpened black crayon.

ALPHABETS OF CAPITALS AND SMALL LETTERS

You will find these alphabets of capitals and small letters useful, when you wish to letter a poster, a show card, a book title, or a card of greeting. Black squared paper may be bought of school supply houses, and the letters drawn upon it with sharpened white chalk. Or, you can rule a 9 by 12 sheet of drawing paper into ¼-inch squares and draw the letters upon that. The forms and proportions of these letters should be memorized, so that you will know which letters are wide, which are narrow, where the upright stem is divided, as in B and E, and all the other characteristics. You should copy these alphabets many times, in fact, until you feel that you know them perfectly.

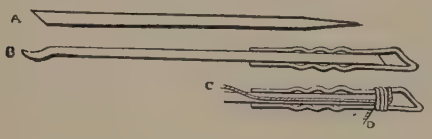
MODELING SMALL SCULPTURES*

in White Soap

BY MARGARET S. POSTGATE

First, we must assemble our simple tools:

1. A penknife or paring knife.
2. Two orange sticks (such as are used for the care of fingernails—you can get them at any drug store).
3. A wire hairpin about three inches long.
4. A yard of string or covered wire (wire preferred).

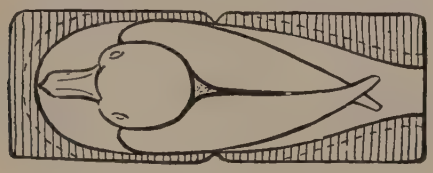


One of the orange sticks should have a pointed end and a blade-shaped end. (See Fig. A.) This we call our wooden tool. If one end of the other stick should be curved (see Fig. B) it will be handy to use in getting at the under side of curved surfaces.

Now bend your hairpin to resemble the one shown at the right end of Fig. B. Place the hairpin along the second stick so that one-half inch projects, and then wrap your string or wire very tightly around it, as shown in Fig. C, until the entire pin is covered except the projecting end (Fig. D). File the projecting end to a sharp edge. This we call our wire tool.

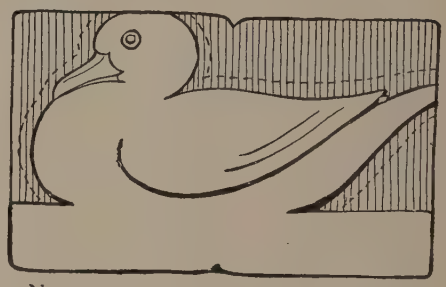
LESSON NO. 1

We have chosen a duck for our first problem. Have a shallow box or tray over which to hold the cake of soap while working. Now, with the pointed end of the wooden tool, draw carefully the outline of the duck, on the sides (Fig. 1). Figs. 2, 3 and 4 are shown to help you see the duck *in the cake of soap,* and to guide you in shaping the top and ends.

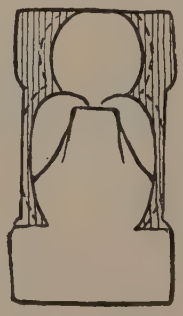


No. 4 TOP

FINISHED MODEL



No. 1 SIDE



No. 2 BACK

No. 3 FRONT

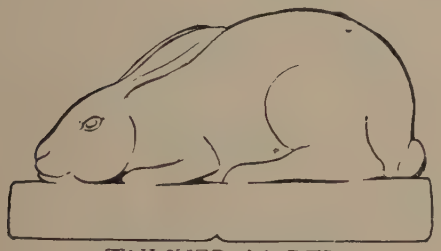
*Courtesy of the National Small Sculpture Committee.

Now, with the knife, cut away the soap, leaving the rough outline of your model as indicated by the dotted lines. This done, proceed slowly with the blade end of the wooden tool, or with the wire tool, trying to form a rounded surface. When you are satisfied with the general form of your duck, put in the wings, eyes and bill with the pointed end of your wooden tool.

Do not work too long on any one side of your model, or you are likely to cut away too much of the surface. Keep turning it. Remember, only practice makes perfect. Do not get discouraged. Keep on trying.

When you have finished work for the day, wipe your knife and wire tool carefully in order to prevent rusting.

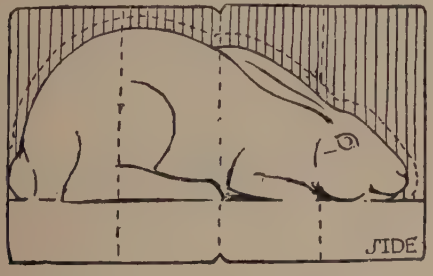
LESSON NO. 2



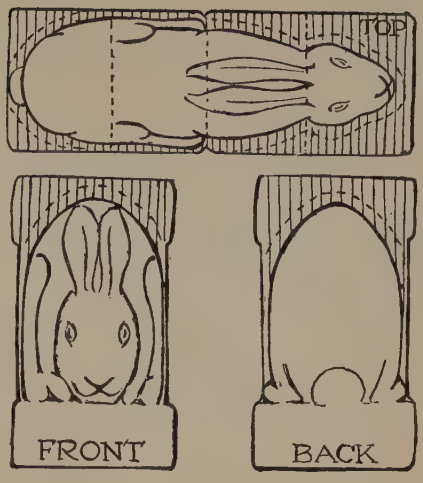
FINISHED MODEL

First, draw very carefully the sides, top, back and front of Mr. Hare on your cake of soap. Now, start with the sides, and with your knife cut away the soap as the dotted lines on the drawings indicate. Do the same with top, back and front. You are now ready to work with either the blade end of your wooden tool or with your wire tool.

It is well to spend a long time working for the form, noticing carefully the highest, lowest, widest and narrowest parts of the animal.



If you divide your soap into quarters, you will see that the highest part of the hare comes at the last quarter; that the head ends at the first



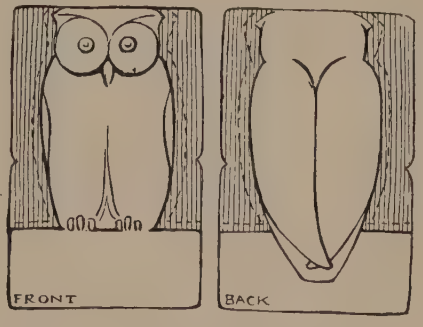
quarter of the bar, that the ears extend a wee bit over the half division and that the hind legs come forward to the half division.

Viewing the model from above, you will see that the back paws and thighs form the widest parts and the tail and nose the narrowest parts. The body tapers towards the front but swells out at the head to taper again toward the nose. Watch all these points carefully and remember to keep turning the model, comparing each side with the drawing of that particular side.

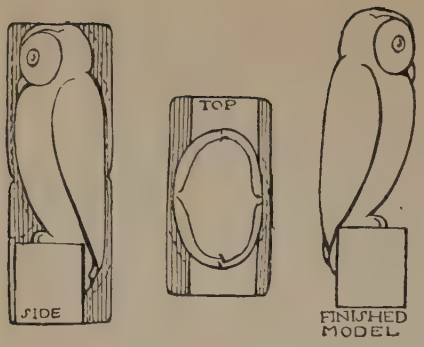
The last step is to draw the lines of the nostrils and mouth and put in the eyes with the point of your wooden tool.

LESSON NO. 3

He's a solemn looking bird—this Wise Old Owl that the Greeks took as their symbol of wisdom



and culture. Farmers like him because he rids their barns of the mice that eat their corn and oats. And since he is short and fat, he will be an easy subject.



How are your tools by this time? Remember, your wire tool should be absolutely firm. If it wiggles, you had better make a new one.

First, hold your cake of soap upright and draw the owl carefully on the front and back. Then start to cut away the soap. Always be sure to leave a little extra soap at first, as is shown by the dotted lines, because if you cut off too much soap, you can't put it back.

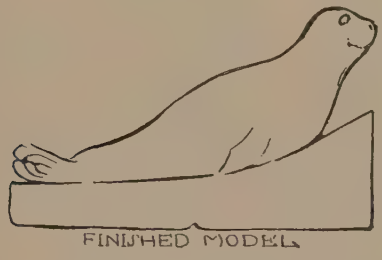
With your wooden or your wire tool shave carefully to the real shape of the bird, turning the soap constantly to get a smooth surface.

The widest part of the bird comes in the upper half of your cake. Notice that his chest swells out and from there he tapers slightly to his feet.

To finish him you will need the blade end of your wooden tool for the wings, bill, and the circles around the eyes. Use the pointed end for the eyes themselves and for the claws.

LESSON NO. 4

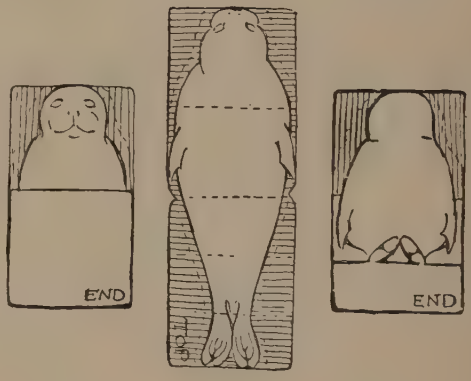
To start making this plump, well-fed looking harbor seal, draw his two sides on the cake of white soap and cut away to the dotted lines. This time we have more base (or "plinth," as we sculptors call it), to indicate the seal's bank of ice or snow. Now draw the top. Notice that you have little or nothing to cut away at the ends.



The seal is very sleek and the wire tool (if it is firmly and carefully made) is the best one to use in trying to smooth him down. Cut or shave with this tool down to the actual form of the seal.

Note in the drawing of the top how the widest part of the animal comes at the first quarter division of the soap. He then grows gradually more slender until near the end his tail grows as wide as the front part of his face.

When he is sleek and smooth and as much like the drawings as you can make him, use the point of your wooden tool for putting in the eyes, nose, mouth and flippers.



LESSON NO. 5

Here we have Mr. Bullfrog so that he can't possibly hop away and go kersplash into some brook or pool.

To carve him, we start at the top of our model. Draw his outline carefully on your cake of soap and cut away all the soap up to the dotted lines. Do the same with the sides.

Then go to work with your wooden or wire tool and shave or cut down to the real shape of the

frog. You will find that your wire tool, provided it is firmly made, is better for this work. Do not hurry. Turn your model often. It is well to study the drawings closely to see just where the different parts of the frog come on your soap. The hind legs extend from the back to the center and are practically in three parts. The eyes bulge and will require some care. Be sure when you are carving his head to leave enough soap to make the eyes.

As the very last step, use the point of your wooden tool to draw in his ears (the circles back of his eyes), his wide mouth, and the markings on his feet.

Remember—As your knife cuts smoothly through the cake of soap, drop all your chips and shavings on a paper or box lid and give them to your mother. She can use them for the dishes.

LESSON NO. 6

About the busiest little thing in the woods in the fall is Mr. Squirrel. The thrifty little chap is scurrying about, gathering his supply of nuts for the winter and storing them away in a convenient place.

To make him, hold your bar of white soap in an upright position and on the sides mark the outline of your squirrel. With your knife cut away the soap up to the dotted lines. Do the same with the front and back.

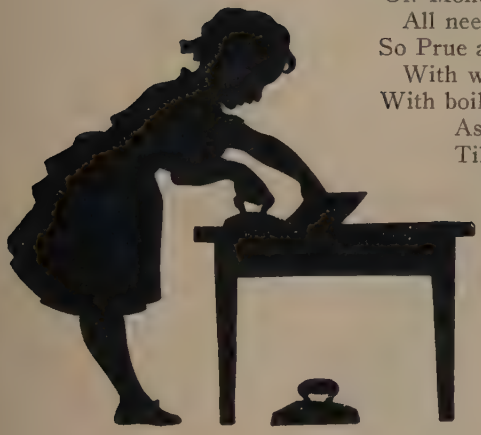
You now have a squirrel in the rough (and don't be discouraged if it looks *very* rough). Now you will need your wooden or wire tool to shave him down to the finished model. Remember to turn the soap often and to shave off a very little at one time. You will notice that the front paws are a little below the upper quarter of your soap and the joints are at the center division where they meet at the top of the hind legs. When you have made your model look as much like the drawings as possible, use the point of your wooden tool to put in the markings of the eyes, nose, mouth, claws and tail.

The designs for stencils given on pages 148 to 151 can be traced on cakes of white soap, and the soap cut away leaving the figure in relief.

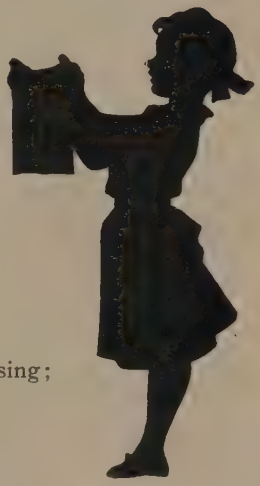
WORKADAY FAIRIES.

WEEK-DAYS IN DOLLY'S HOUSE

BY JOHN BENNETT

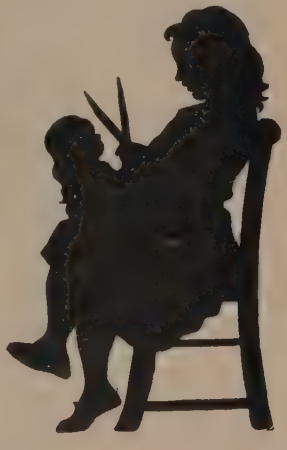


On Monday morning Dolly's clothes
All need a thorough tubbing;
So Prue and I put in the day
With washing, rinsing, rubbing;
With boiling, bluing, bleaching, too,
As all good washerwomen do,
Till Dolly's clothes are clean as new
And we have finished scrubbing.

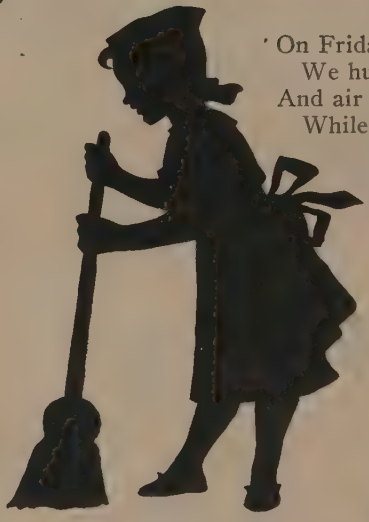


On Tuesday comes the ironing,
The starching, sprinkling, pressing;
For doing gowns up prettily
Is half the charm of dressing.
And from our irons all the day
We have to coax the cats away,
For with them they will try to play—
And that would be distressing!

On Wednesday thread and needle fly
With basting, whipping, stitching;
With hooks and eyes and buttonholes
To keep our fingers twitching.
And while the scissors snip, snip, snip,
We patch and darn and mend and rip,
Till all is trim from tip to tip,
And Dolly looks bewitching.

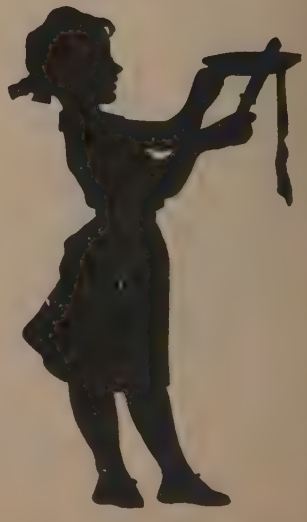


On Thursday afternoon
we take
A recess from our
labors,
Dress Dolly up in all
her best
And call upon the
neighbors;
So she may learn to sit
up straight,
Nor come too soon,
nor stay too late,
And always think to
shut the gate
At Tompkins's and
Tabor's.



On Friday, dusting-rag in hand,
We hurry up the sweeping,
And air the household furniture
While Dolly still is sleeping.
We dust the mantels
and the chairs,
The closet-shelves and
kitchen stairs,
And shake the rugs
and portières
Like truly-true
housekeeping.

On Saturday we bake our bread,
Enough to last till Monday,
With sugar-pies and apple-
tarts
For Dolly's dinner
Sunday;
With doughnuts round
as napkin rings,
And cookies fit for
queens and kings—
For oh! it takes just lots of
things
To feed a dolly one day!



You can always find old envelopes around the house. From these you can make these little cut-outs that will stand up. You should paste the heads together and twist or curl the tails. Also you can color them with your crayons. You may make horses, ducks, geese, cats, dogs, pigs, and any other animals that you choose.

MAKING THINGS OUT OF PAPER

BY MRS. BERTHA PAYNE NEWELL

FOLDING AND CUTTING

THE kindergarten folding evolved by Froebel was a device at first to employ his pupils pleasantly on rainy afternoons, when they could not have their customary excursions afield. Later he developed it elaborately into a long series of complicated folds—symmetrical ones that made little designs, and realistic ones that were called "life-forms."

The life-forms seem most appropriate to little children and have been added to since his day. A few are given here. It will be necessary to have paper cut in accurate squares at first. Later, accurately cut oblongs can be used to better advantage.

The younger children lack the control of eye and hand to do much folding, for it requires exactness. The forms given below can be done in rather heavy paper cut 5 x 5 or 6 x 6 inches.

It will be noticed that one form grows out of the preceding, and leads up to another, which follows from it with but one slight step added. This fashion of working is in kindergarten parlance "sequence." It is a very helpful method of leading children to overcome difficulties bit by bit.

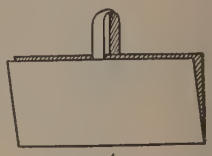
Easy Folding, Series I

One day a group of four children, the babies of the School of Education Kindergarten, went into the garden to pick nasturtiums, to carry to their mothers. I gave each one a paper and asked them if they could make something of it to carry the flowers in, so they would not wilt. They had been given no folding lessons, so the problem needed some thinking and experiment on their part.

Fryar pinched his together at each corner into a dish-shape and asked for paste to make it fast. Bessie made hers into a roll, open at each end, and thought she could tuck the flowers inside. James made a kind of cornucopia of his and asked for pins to fasten it. Charles could think of no way, but decided to make his like James'. Donald folded his square in the middle, making it in the shape of a book. I was rather pleased to see them go to work in such direct and original ways to meet the difficulty, for it meant thinking to *make the means at hand meet the end.*

The next day they went into the garden to gather lettuce, and instead of repeating the work of the day before, I offered to show them how to make a little basket with a handle, somewhat in this fashion:

"Lay your papers on the table. Take the front edge (the one next to you) and fold it over till it touches the *back edge* and lies on top of it. Press down on the folded side of your paper till it lies *flat.* Now use your thumb-nail for a little flat iron and smooth this edge still flatter.



1

Here are two little squares. If you will fold these in half, as you have done this paper, we can paste it in at the ends of this book-shaped paper to close them up. Here is a strip for a handle. Show me where you would paste it." (See Fig. 1.)

In this instance I did not show the children how to make the article *until they had felt the need of it,* and had tried to make something that would fill it in their own way.

Sometimes I would put a finished thing on the table and say, "Would you like to make one like this?" and let them find out how to do it. In either case they have to do some thinking, which is good for them. If the thing to be done is in the nature of putting parts together, as in the wagons described in a preceding section, it might be well to put a finished one before them, and lay the material down for them to build up one of their own.

2

Fig. 2 shows the same size square folded into a book. Pictures from magazines may be pasted in it to make a doll's scrapbook, or it may be covered with make-believe writing, or pictures can be outlined in it to be colored by the children with crayons. It is easier than the basket, but we *needed the basket.*

Fig. 3 is the lower edge folded to the upper edge, and the whole opened. We call it a window. It might be made of the semi-transparent paper that cereal packages are wrapped in and a frame of thicker paper strips pasted around it.

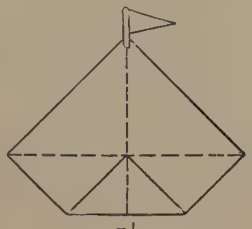
3

4

Fig. 4 is folded by laying one corner of the square on the opposite one, making a triangle. It makes a good shawl for an old-lady clothespin doll. It is fun to fringe it by snipping slashes round the edge.

Figs. 5a and 5b show something that suggests a sailboat. Fold window, shawl, shawl made by two

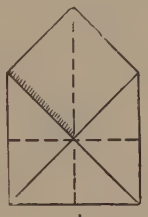
5a



5b

other opposite corners put together, open, and fold one corner to touch center.

6a

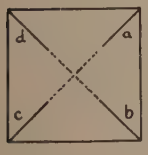


6b

Figs. 6a and 6b are steps in making an envelope, into which a letter can be tucked.

7

Fig. 7 becomes a valentine when a picture is pasted in the center.



8a

8b

Figs. 8a and 8b are steps in making a pinwheel. Cut in heavy lines and pin corners a, b, c, d to center. Thrust pin in end of rod, as in 8b.

Easy Folding, Series II

(Illustration on page 86)

Fold as in Series I, front edge to back, right to left, making "window." Open. Fold front edge to meet the crease that runs from right to left through the center. Same with back edge (Fig. 2). Turn over and play with as tunnel; stand on end for cupboard doors (Figs. 3 and 4). Crease into square chimney (Fig. 5).

Lay on table, doors down. Fold a short end to meet middle crease, same with opposite end (Figs. 6 and 7). Turn over for bridge (Fig. 8).

Suggestions for Play with These Folds

The cupboard may have straight horizontal lines drawn on it for shelves, with apples, bottles of jam, etc., drawn on them. Fig. 6 may be called a toboggan, and made to slide down a smooth slanting surface. The tunnel may have toy cars pushed in and out of it, be put in sand-table as a bridge used over stream in sand. It may also serve as a chimney glued to a paper box for a house.

A Good Barn or House

Fold as for bridge. Open (Fig. 9). Mark the three creases on two opposite sides with pencil. Cut in marks. Pinch middle crease and lap the four free squares over each other, two middle ones first, then end ones. Fig 10 shows process. Fig. 11 shows barn pasted and doors and windows cut out.

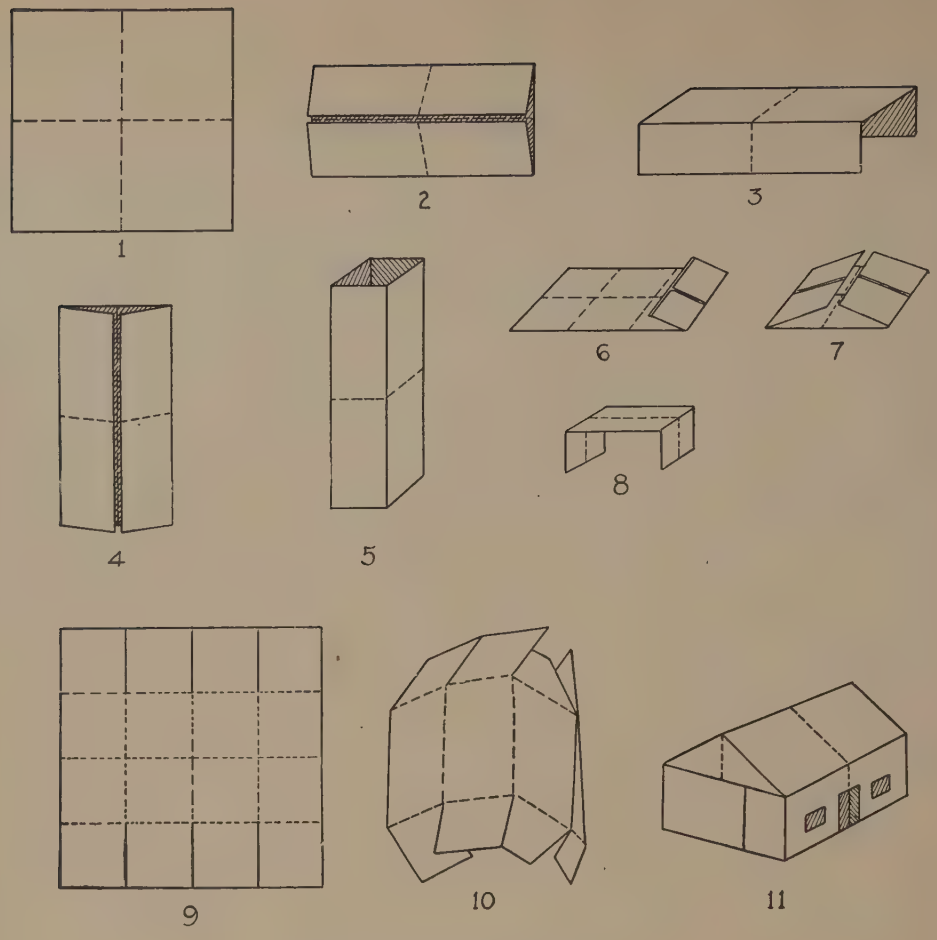
This would be a good model for the children to work out from your finished one with the marked paper as a guide.

This same foundation will be used in the sixth year for a set of furniture.

PAPER-CUTTING

No "made" toys have ever given us so much pleasure as we got with blunt-pointed scissors and colored crayons. They were our resource on several long journeys. We tucked them into the handbag with a tube of paste, and old magazine and a newspaper to be spread on the floor of the car to catch the clippings (not to make the porter too much trouble). Then with cutting out pictures, coloring them, folding tents, cutting soldiers in rows, chicken-coops, chickens, and what not, the time passed wonderfully.

The advertising matter in magazines is full of pretty things, many of them done by clever artists, that can be colored, cut out, and pasted into scrapbooks. Helen and Sara took some useless official books that had wide margins and



EASY FOLDING SERIES, NO. II

good bindings, and filled them with pictures for the children's ward in a hospital.

Old department-store catalogs furnish rugs, furniture, and kitchen utensils as well as paper ladies for the paper doll-house.

FREE-HAND CUTTING

Too much cutting out of pictures sometimes keeps children from becoming independent in cutting free-hand. They are afraid to launch out. But at first it is good training simply to follow a line.

Four-year-old Nancy had a struggle to cut paper dolls without amputating a limb.* Yesterday she showed me a family with pardonable pride. There was not a cripple among them. That's the result of frequent cutting-bees under the superintendence of Helen. Now we want to see Nancy developing some power to make pictures of her own with the scissors.

It takes a good deal of random snipping to find out that a turn of the wrist will turn the line at will. To-day we will spread a paper on the floor and when Nancy comes to call, will let her snip and see what pictures she can find in the scraps. Here will be a shoe and here a tent, and now something that looks like a house. If I give her a long strip of paper and let her paste it under the house, it will look, when mounted on a sheet of dark paper, like a bird-house on a pole.

Scraps like wings can be made into flying birds,

*Before construction can be undertaken, control of the scissors should be gained. The first cutting will be making little snips, which can be used to fill a pillow for the dolls; paper may be fringed for rugs and table runners for the playhouse; table spreads, rugs, and bedding may be cut, and napkins cut and folded for the playhouse. By this time the child should have sufficient control of the scissors to cut successfully from the magazines pictures with straight edges.

and so the picture grows. The same house, with a snip cut out for a door, looks like a dog-kennel. A little triangle is like a chicken-coop. If Nancy can not cut the biddies, I can. When they are pasted on the paper, I can give her short strips to lay on the paper for fence-posts and long ones to lay across for the boards, and so we have a picture of a yard with bird-house, dog-kennel, and chicken-coop.

All this is drawing. We are representing things as they look in outline. As we look at what we have done (whether by purpose or accident) we feel its inaccuracies and want to observe the real thing more closely the next time we see it. This is the way all drawing, modeling, and cutting helps observation; and is the reason why high school students of botany are required to draw the plant-forms they are studying.

Little children in the nursery are studying in the same way, with this difference: they are interested in the *story* aspect of their work, and not much in its accuracy. Nevertheless, their drawing is not mere amusement. It is training the eye to see and the hand to carry out.

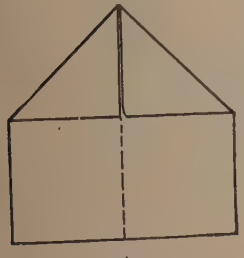
ADDITIONAL SUGGESTIONS

Let a square be folded in half. Fold one of the resulting triangles in half, putting sharp corners together. Draw for child lines from folded edge toward longest edge. Cut out strips on these lines. Open. Result: Chicken-coop, slatted.

COTTAGE

Chicken: Cut a large and a small circle. Paste one halfway over the other. Draw bill and legs.

Cottages: Cut a square into four small squares, another into triangles. Let the triangles be pasted on the squares, making four cottages in a row.

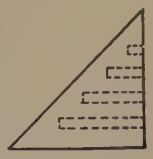


1
FOLDED SQUARE

2
SAME FOLDED AND DOOR MARKED FOR CUTTING

House: Fold a square in quarters, fold two adjacent corners to the center, making outline of house with roof. Fold this through center,

1
TRIANGLE



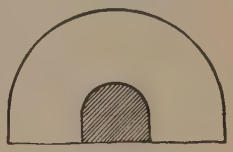
2
FOLDED AND MARKED

3
CHICKEN COOP

dividing peak of roof in half. Cut out oblong for door. Unfold. Cut little oblong to make chimney. Paste on roof.

Apple: Give a child a circle or let him cut one. Curve in one side a little. Make stem and paste in depression.

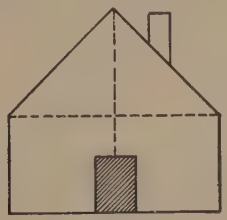
APPLE



ESKIMO HOUSE

Eskimo House: Give or cut circle. Fold and cut in half. Cut tiny opening in middle of straight edge, for doorway.

Crescent Moon: Use other half to shape by one curving cut.



3
HOUSE OPENED

CRESCENT MOON

THINGS TO MAKE OUT OF NEWSPAPERS

BY MRS. LOUISE H. PECK

For our fun we need only flour or prepared paste and the newspapers which have been folded carefully away, waiting for us all this long time.

Chains.—Cut the white margins from several newspapers, very straight and all the same width. Then cut these in strips five inches long, all exactly the same length and with ends cut straight. Take one strip and paste ends evenly together to form a ring, holding for a moment until the paste catches. Slip another strip through this ring, paste the ends as before, and now we have two rings, one linked within the other. Go on in this way until a long chain has been made. Sometimes brown wrapping-paper strips may be alternated with the white newspaper strips. Later, make chains that will teach numbers: one brown, one white; two brown, one white; three brown, two white; using all kinds of combinations.

Don't cut the strips for the children. The preparation of their own material is a wonderful part of the lesson.

When several long chains have been made, they may be swung to music or singing, or used as a decoration for the playroom.

Pussy Chains.—These are also made from evenly cut margins, and in as long strips as possible. Lay the ends of two strips across each other at right angles, and paste together. Fold the under strip over across the pasted end of the upper strip, but do not paste. Keep on folding one strip over the other at exact right angles until they are used up. Paste on other strips to make the chain longer, and paste ends together to finish. This makes a delightfully "stretch-y" chain.

These chains are pretty made of two colors, and may be used as decorations for a Christmas tree or to hang on the wall.

Paper Sticks.—Now let us make some paper sticks for laying patterns or pictures on the table as we would with toothpicks. Cut a strip from the white margin or from the printed paper half an inch wide and twelve inches long. Dip one corner of one end in water and begin to roll tightly at a slant. Keep on rolling tightly, holding the tip with the right hand while the left holds and rolls the strip. When completely rolled into a paper stick of five or six inches, hold firmly and fold over the end. No paste is needed. This makes the old-fashioned lamp-lighter or "spill." Illustrated newspaper sheets make pretty variegated sticks.

When fifty or more of these sticks have been made, use them for laying pictures of houses, trees, fences, and other objects. Sometimes we bend the sticks for roofs, curves, and corners. If the child wishes to keep a picture, have him make a penciled drawing of it in a scrap-book prepared of smooth wrapping-paper. All kinds of geometric figures may be made with paper sticks—oblongs, squares, circles, triangles, and so on.

The bent sticks are kept in one box, the straight ones in another. In still another box we have all kinds of queerly-bent paper sticks. These are our jackstraws, and we make our wand for lifting the sticks from a longer strip of rolled paper, bent at the small end to make the hook.

Paper Pipes.—These are made of whole sheets of newspaper rolled into long loose cylinders, measuring three or four inches across the end, the ends being folded or bent tightly in toward the center to keep the pipe from unrolling. To make water-pipes, slip the end of one into the end of another, and lay as many as are desired, following the mopboards or anywhere else about the room.

These rolled sheets may be stood on end for a stockade fence, or placed across each other to build a log-house.

Stepping-stones.—Half sheets of paper placed on the floor a long step apart make good stepping-stones over a running brook, the floor being the "water." Care must be taken to step straight and squarely on the paper to avoid slipping. The game is a fine one for developing quick balance. Sometimes we play "Eliza Crossing the Ice" with the dolls held tightly in our arms.

Castles.—Roll doubled sheets of newspaper into cylinders, big short ones, and big high ones. Look at some good castle pictures and see how to pin the cylinder towers together, with long balconies. Good drawbridges and portcullis may be made by skillful fingers, also a moat from brown paper. The growing castle in the corner of the room has been known to make a whole family study pictured castles as never before, and when everyone helps in the building, there is more than a castle being built.

Your little hands are wonderful gifts; the powers of the many little muscles of the fingers are numerous. Did you ever try making your fingers tear objects out of pieces of wrapping paper? Always hold the paper between the thumb and forefinger of each hand. Tear only a small bit at a time, thus getting finer detail of the object desired. With a group of your children friends, a guessing contest can be enjoyed by deciding what the object torn is supposed to represent.

MAKING DOLL-FURNITURE

BY MRS. BERTHA PAYNE NEWELL

Suppose a child wants to make a paper doll-bed. You can let the child alone to work at it in her own way or you can help her in any one of several ways. Left alone, the problem may baffle her; in all probability it will if she has no clue to its solution; that is, if she sees no plan, imagines no details, of *putting together.*

You want to help her to see the parts of a bed in their relation, to see how they go together. Then they must be shaped, at least, there has to be some practicable, workable way of making them *stay* together. It would be easy to do all her thinking for her, but that would not help the next time. In the educational sense it would not be practical.

You can help her to see that a bed is made of three main parts—a head, a foot, and a horizontal part to lie on. The head and foot serve, when extended, as legs. You might give her a flexible piece of cardboard or heavy paper, and let her cut out these three pieces in her own way, and hold them together the way they belong.

The next step is to find a way of fastening them together. If she does not think of a way you might *show how* you would do it: by folding up a narrow strip from the end of the main part, to give a surface to which the head can be glued, and the same for the foot. A coarse needle and thread could be used to sew them together if the paper is soft and tough.

If the result is satisfactory she will probably want to make many more, as this seems to be Nature's way of getting children to practice any new accomplishment. Then there will be other things wanted to which the same method of thinking out and putting together can be applied.

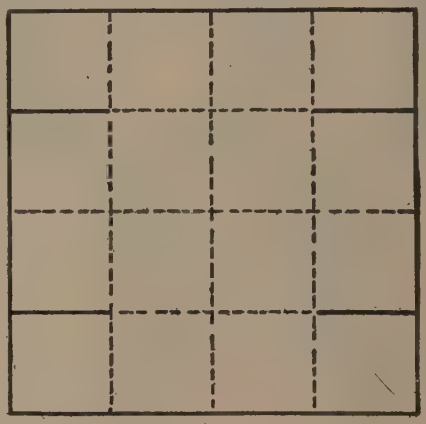
VARIATION OF METHODS

Then it would be well to try other ways of getting the paper furniture made. Having seen the parts in relation to each other and put them together, it might be a step in advance to propose getting them all out of one piece of cardboard. Instead of cutting four strips for table legs and pasting them at the four corners of a square, the plan can be drawn on paper, cut out, and the legs folded at right angles to the top.

Much of this kind of furniture is provided in the "cut-outs" in popular magazines. A ready-made thing is really given children in these, which is well enough in its way and would be all that might be desired, if it would only lead them to self-designed things. My observation leads me to believe that it does not.

After this experimental work has been enjoyed it will be a satisfaction to most children to make the toy furniture upon some plan which can be changed and adapted to many things. The most satisfactory one I have ever seen is given below. The objects made are well-shaped and proportioned, and have a kind of finish that children appreciate after their own less stable furniture has been worked out.

The foundation is made as in Fig. 9 in Easy Folding Series, No. II, on page 86. Opened out, it shows sixteen squares, outlined by creases,



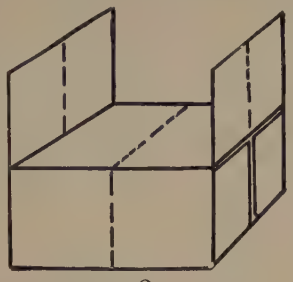
1

Figs. 10 and 11 show the process of getting a barn from this foundation by a series of clips, folds, and pastings.

To make a bed, table, or square box, the creases on the inner sides of two corner squares are cut. These two squares must be on the same edge of the paper. Then cut in the same way the creases on the inner sides of two corresponding squares at the opposite edge of the paper. (See Fig. 1.)

To make a table, fold the row of four *uncut* squares at right angles to the rest of the paper. Repeat this on opposite side. Let small oblongs

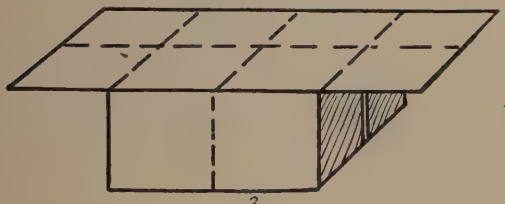
between the squares at end stand level to make end *leaves* of table. Fold squares next them toward each other. Now it is done, save for bracing. Cut from paper folded like the foundation (in sixteen squares) a square 2 x 2. Paste it over the two squares at the end of table and on underside of leaf. This binds "flapping" squares together and stiffens leaf. Repeat at other end. (Fig. 3.)



2

Bed

Fold and cut exactly like table, but turn small oblongs at ends *up* to form head and foot of bed. Cut 2 x 2 square as before and paste on the out-



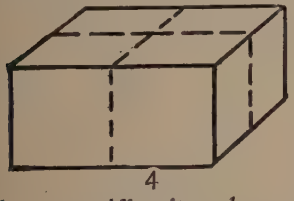
3

side of head and foot of bed, to strengthen and make smooth. (See Fig. 2.)

The basket (Fig. 5) and the wagon (Fig. 6) are modifications of the table, turned upside-down.

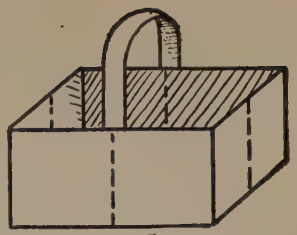
Bureau

Fold two squares of paper as before into sixteen squares. Lay one aside and proceed with the other as for bed and table, but fold small oblong flap down over the two flapping squares and paste. This makes a square box. Stand it on one side, to contain the drawers. Cut the other folded square in half, making two oblongs. Paste one of them at the back of the box, to stiffen it and serve as a mirror.



4

Take two more squares of paper and fold into sixteen squares, but first cut a very narrow strip from two adjacent sides of each, to make these squares slightly smaller than the ones used before. After the sixteen squares have been folded, open the paper, all but one row of four squares, leave these folded over. Now fold them with those that lie on at right angles to the rest of the paper, also the row of four at the opposite edge. This makes the paper trough shape. One row of four squares forms the bottom of the trough. Cut the creases that run at the sides of each *end square* of this row of four. Fold them *up* at right angles to the bottom. Slip them inside the pair that are doubled on the front edge. Now you should have an oblong box with one edge doubled and firm. Push it inside the bureau for the bottom drawer. Repeat to make top drawer.



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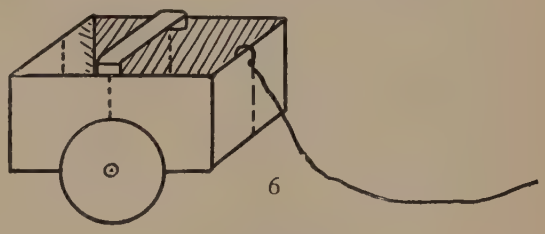
Now the bureau is ready for any trimmings your little girl wants to put on it, in the shape of bureau scarf or tin foil mirror. Small black laundry-studs make good handles for drawers.



6

Washstand

This can be made like bureau with lower back. Other furniture can be worked out with the same foundation. You can use your ingenuity to make sofa, armchair, and dining-room chairs. They are very pretty made in brown, tan, or green smooth cover-paper.

Furniture calls for a room, or better yet, a house. Rooms of shoe or hat boxes are satisfactory. Windows can be cut in the sides and curtained with tissue-paper or muslin. The walls can be prepared with scraps of wall-paper.

Houses of wooden boxes are more durable. Did you ever make one of an orange crate when you were a little girl?

A DOLL-HOUSE

Janet wanted a house, and Mrs. Reed, remembering what fun she had had with them, suggested that they get a fruit-crate from the grocery. The walls were rough and had to be covered with paper to make them pleasing in the doll's eyes. Finding no scraps in the attic, they tried to buy some last year's samples at the decorator's, but could not get any. So Mrs. Reed

took some smooth sheets of light-colored wrapping-paper and told Janet if she would cut the pieces to fit the walls she would help her decorate them. Janet measured the height of the wall and made a pencil mark to show where it came on her paper, and then folded it off to that width. Then she poked this piece into the house to see how much she would need to cut off for the side wall of one room.

Mrs. Reed came in then and suggested that it would be easier to measure this on the outside of the wall.

When the pieces were all cut they decided to make the bedroom a pale green and the downstairs living-room a soft orange-color. Mrs. Reed advised Janet to mix as much paint as she would need for all the paper for one room at one time, so it would be exactly the same shade. It took a good deal of mixing and trying to get it just right.

THE TULIP BORDER

They fastened the sheets of paper to a drawing-board with thumbtacks, so that it would not bother them by curling up when wet. First Janet wet the paper all over with clear water in a big brush. Then she took up all the extra moisture with a soft cloth and put on a wash of green, sweeping the brush from left to right in long strokes. The wash of clear water made the color go on without streaking.

When the papers were all tinted they thought one at least might be decorated with a border of some kind. Mrs. Reed showed how to draw with a ruler a line 1½ inches from the top, and this was tinted with two more washes of green to make it a little darker. The living-room was measured off in the same way. Mrs. Reed drew a tiny tulip on a card and cut it out. Then Janet put it about the ruled line and drew around it and then again, until a row of tulips blossomed on the border. These were painted red with green leaves.

Janet had learned how to make paste after many experiments. She knew that four teaspoonfuls of flour mixed with eight tablespoonsfuls of cold water and cooked until clear would be thick enough. She put it on with a large painter's brush, an inch broad, and soon the house was ready for furniture.

FURNITURE FOR THE DOLL-HOUSE

Some empty spool-boxes seemed the best things at hand to make over into furniture. One served as a bed and its cover as a table, but both lacked legs. Janet saw a broken box and knew this would provide them. She cut long strips for the table, measured them to the same length, and glued them inside the rim with liquid glue. The bed legs were cut half as long and glued to the outside of the box, which was turned upside down to hold the mattress.

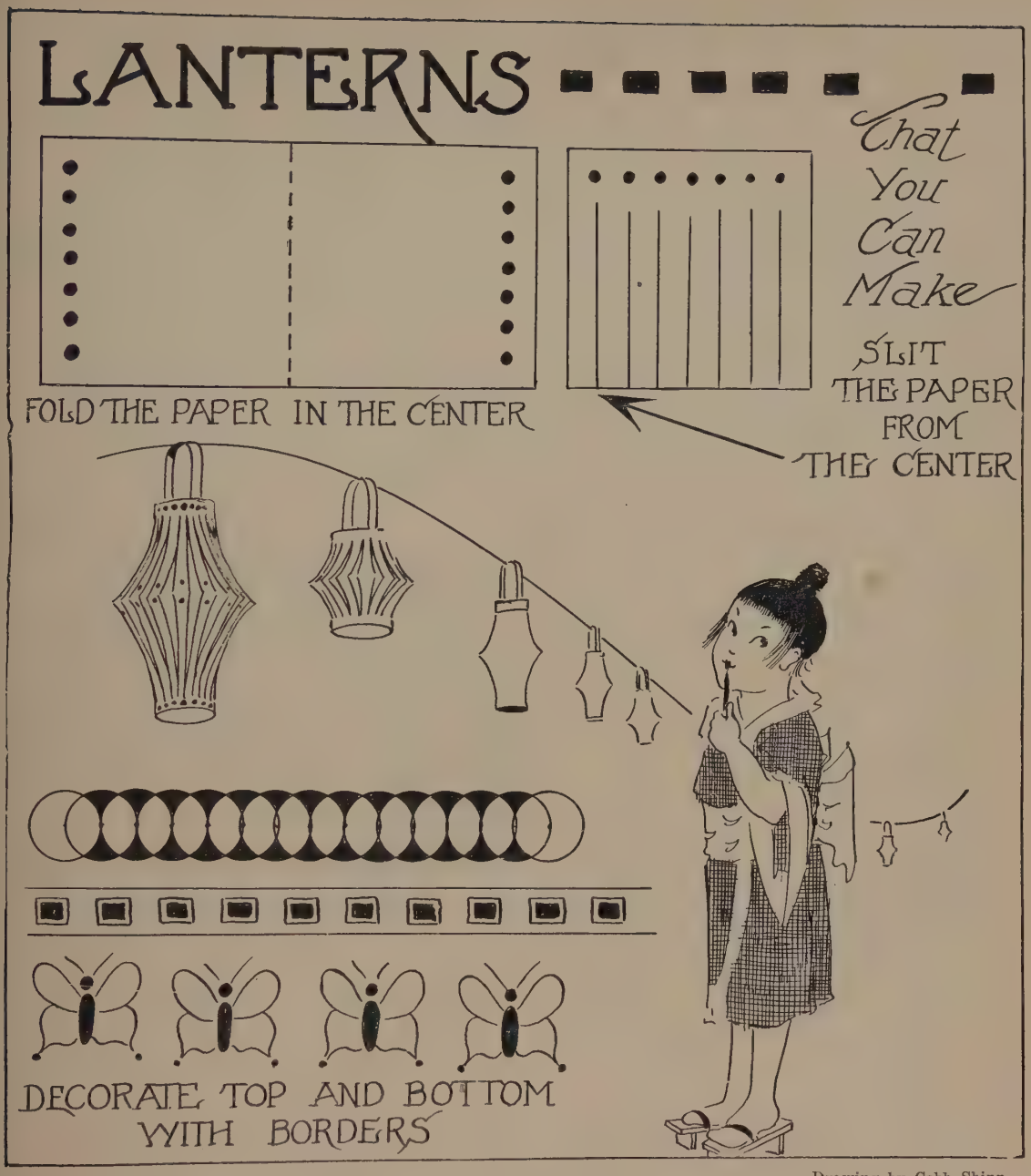
This did not look right, and then she had a happy thought. She took the cover of a box, cut it across into a short and a long piece, fitted one end of the bed into the long one for the head and the other into the short one for the foot. Now it looked very real and inviting to even a doll of fastidious tastes.

The next morning mother and daughter went to the nearest dry-goods store to get more spool-boxes, and happened on a rich find. The clerks were busy taking inventory of stock, a general house-cleaning had littered the floor with boxes of all sizes. Janet joyfully gathered an armful and carried them home.

The next morning she got her mother to help her make a bureau to match the spool-box bed. They took one end out of a box and stripped the sides loose from it half-way down. These sides were bent toward each other and glued where they lapped. This made the back, sides, and mirror of the bureau. The drawers were made by cutting straight across the end of a box and pasting a folded paper over the back to close the open side.

A wardrobe was the easiest thing to make. Janet stood a box on end and fastened the top of a cover to it with paper strap-hinges.

They had the most fun with the drum and wheel-shaped pasteboard things on which tape and ribbon had been wound. From these they made a cake-box, pail, oil-heater, and coal-stove. The kitchen range was made from a candy-box with doors cut from the side for oven and fire-pot, and circles marked on top for pot-holes. A piece of paper, rolled up, was stuck into a small hole for the stovepipe.


LANTERNS
That You Can Make
FOLD THE PAPER IN THE CENTER
SLIT THE PAPER FROM THE CENTER
DECORATE TOP AND BOTTOM WITH BORDERS

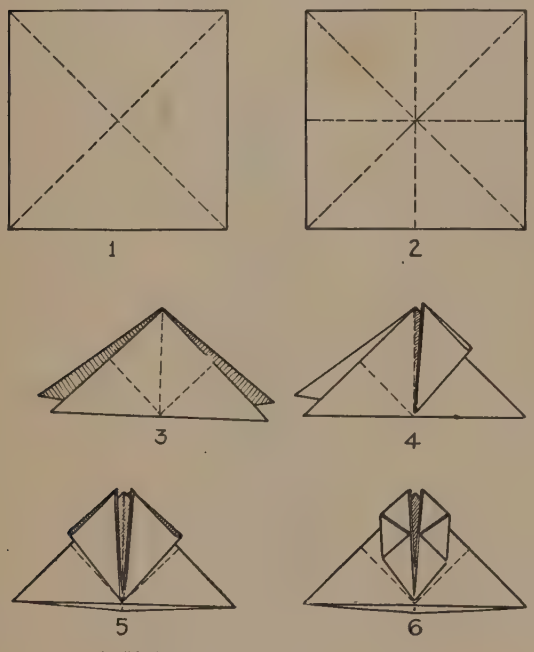
Drawing by Cobb Shinn

You can make some lanterns that will look almost like real Japanese lanterns. Take square, or oblong, pieces of paper, using different colors. Fold in the middle and cut the slits, being sure to make the slits all the same size. Open out your paper and paste the long edges together. To make the handle, take a long strip of paper and paste the ends to opposite sides of the lantern.

MORE PAPER-FOLDING

BY MRS. BERTHA PAYNE NEWELL

PAPER-FOLDING has some forms that children enjoy and that are easy, if one will only observe one little trick, which is this: after folding the diagonals of a square—corner to corner making triangles—*it must be opened into a square and turned the other side up;* then the paper is folded front-to-back edge to make an oblong, opened, and right folded to left-hand edge, making an oblong. When this is done, the paper is creased in such a way that if it is turned one side out

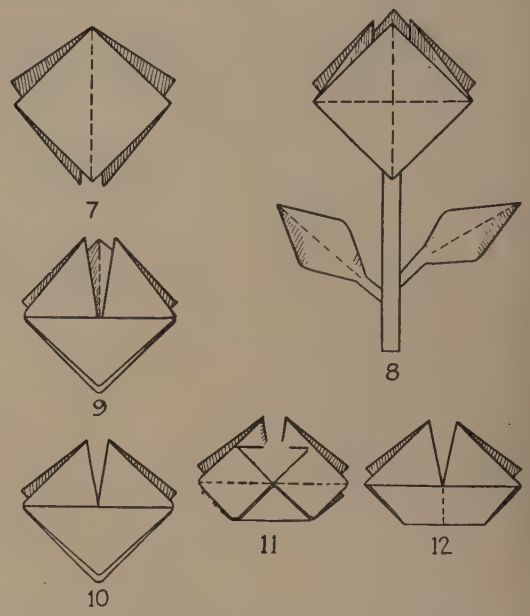


A SOLDIER CAP WITH A COCKADE

it will fall as in Fig. 3; if turned the other side out it will take the shape of Fig. 7. It is impossible to make the cunning soldier-cap and the equally fascinating sailboat without observing this matter of folding the diagonals and then turning the paper over before folding the diameters.

Fig. 3 shows the first step in making the cap. It may be fringed across the long edges and used as a candle-shade. A strip of paper rolled serves for a candle, an empty spool for candlestick. The shade is fastened on by a pin run through the apex of the shade and top of the candle.

Fig. 4 shows one sharp corner folded up to the right-angled corner and creased. Fig. 5 shows this repeated with the other sharp corner. Now there is a triangular cap with a square on



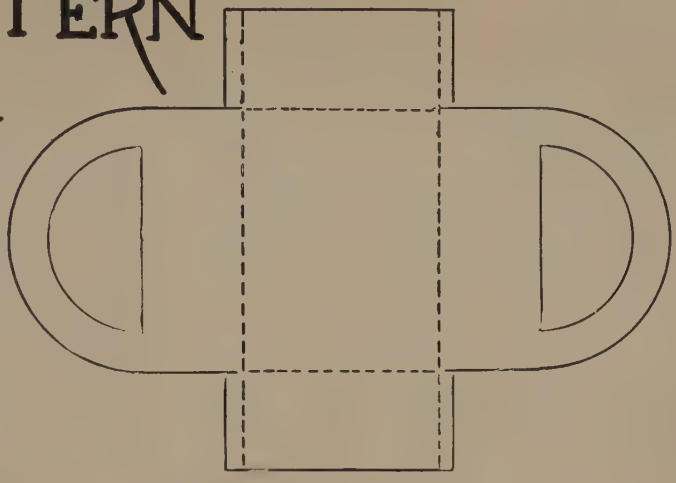
AN UMBRELLA, A FLOWER, AND A BOAT

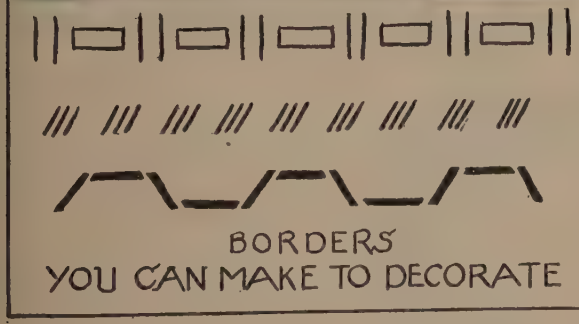
one side split in two triangles. Fig. 6 shows the right angles of these two small triangles folded over to the "crack" between them, making a cockade.

Fig. 7 is often called an umbrella when a stick is thrust in for a handle. Fig. 8 shows it turned with open side up, pasted on a card with a stem of green paper and green leaves, to make a conventional flower.

Fig. 9 shows the same with the right angle on top turned down to the opposite one, and Fig. 10 shows it turned over and with the other right-angled corner turned down. Fig. 11 shows it with this right-angled corner turned back, first to the top and then to the crease running across the middle of the square and the bottom *thick* corner folded over to meet it. Fig. 12 shows the boat set ready for a good blow into the pocket-like sails, which will send it sailing across a polished

The PATTERN for a DAINTY LITTLE BASKET that Can be used for Flowers, Nuts and other things





BORDERS
YOU CAN MAKE TO DECORATE IT

Drawing by Cobb Shinn

It is best to make your pattern first on a piece of paper and see whether you have the proportions correct or not. Then trace the pattern on the cardboard that you will use to make the basket. Before you fold and paste the basket, draw and color the border. Then fold on the dotted lines and paste the corners and the basket is complete.

table. If dipped in melted paraffine this or any other paper boat will be ready for real water.

Other forms can be evolved from the flower shape that precedes this, including a balloon. Can anyone study it out?

SNOW-CRYSTAL CUTTING

Take a circle of thin paper and fold it in half.

Fold this half circle again in half.

Open into half circle, and notice crease marking middle of straight edge.

Fold one-half of the straight edge upward until its end touches the curved edge and adjust it so that a segment is folded over equal to the one in view (Fig. 2).

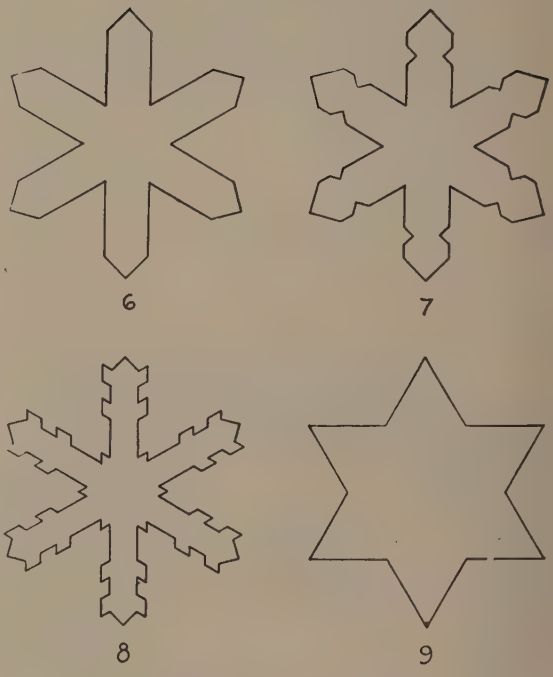
Fold the other straight edge backward in the same way. The half circle should now be in thirds (Fig. 3).

Crease firmly and cut from corner to corner in straight line. (See dotted line in Fig. 4.)

Fold this triangle in half, so that the *thick* corner is divided in half; draw dotted line parallel with one edge and cut in it. (Fig. 5.)

Open. (Fig. 6.)

Figs. 7, 8, and 9 show variations made on the foundation 5.



SNOW-CRYSTAL CUTTING

HOME PLAYS *for* LITTLE PEOPLE

BEAD-STRINGING

BY MRS. CARRIE S. NEWMAN

STRINGING beads has always been a favorite occupation of little children. It is, we presume, an instinct inherited from their ancestors, as beads of stone or metal have been found in the tombs and caves of many ancient peoples. All primitive folk have delighted to decorate themselves with necklaces of various kinds.

But the haphazard material usually supplied the children has prevented satisfactory results, and so the interest quickly dies and bears very little fruit.

To satisfy this instinct and make it of real educational value, the kindergarten provides large wooden beads of the six prismatic colors and the three forms, ball, cube, and cylinder. These are strung upon shoelaces or stout string, and the combinations that can be made are simply limitless.

At first one string alone is used; later, as the child gains skill of hand and development of mind, two, three, or even four strings may be used in one combination, so the work can be spread over a number of years.

The tiny child of two years is delighted to run the tag through the hole in the bead and see it run down the string, and will fill string after string with a miscellaneous assortment. His joy is confined to the manual operation, to using his hands; form and color are as yet meaningless to him. But little fingers are being trained and brought under the control of their owner.

Then, just at the right moment, the mother or an older child suggests that he pick out all those like sister's red hair ribbon, or the red geranium in the vase, and a whole new world opens before his eager eyes as comparison and classification become factors in his play. His first attempts will probably result in a mixture of red and orange, if red is the color chosen, or of blue and green if blue is what he is seeking, but these difficulties will soon be overcome. After stringing red or blue beads he will delight in a game the object of which is to find all the articles of that color in a given space, the room, or the garden.

COMBINATION STRINGING

Once familiar with the different colors, he can begin making combinations. Here the uncolored beads are valuable, as the combinations are more truly artistic. If Mother or Sister makes a chain of one red, one white, he will hail it with delight as prettier than the one color and be eager to imitate. The next step is to make a different combination. He has now entered upon a limitless source of joy, for it has been calculated that four hundred different combinations can be made on single strings and more than a thousand where several strings are used as one. Of course this, like other occupations, gives greater pleasure when several children work together, each aiming to make the prettiest combination he can imagine.

A glass prism hung in a sunny window, so that a rainbow is thrown on the floor or wall, will greatly delight the children and lead to the making of rainbow chains. Soap bubbles will often provide a similar valuable experience.

A new line of thought may be started by calling the children's attention to the colors of flowers and suggesting that they make chains to represent certain flowers—yellow and green for buttercups, blue and yellow for forget-me-nots, for instance. At this time a box of paints and experiences in mixing colors will be most valuable.

LAYING BEADS IN PATTERNS

The beads need not always be strung. Many games of position and direction may be played, as the child lays borders of contrasting colors, or

picks out green cubes and arranges them to represent a lawn and places a border of tulips or crocuses around it, if such be a part of his environment.

What a gloriously happy rainy afternoon might be spent in thus reproducing in miniature his outdoor surroundings! Would it not be worth while going to some public park or garden purposely to get such a setting for his play if there is no garden at home? Will not such memories be lifelong possessions, lending a charm to picture and poem in later life? Are not many lives dwarfed and stunted just for the lack of such experiences in early childhood?

Another trip might be taken to drink in the wealth of color in the market or fruit store in the Autumn, and the beads used to reproduce it. Then if Father will lead the little minds to penetrate into the wonderful life-history of some of these children of Nature, he will add to their lives, and perhaps renew in his own that which no money could purchase. The natural culmination of such experiences is of course a song which embodies these thoughts.

Special attention may be called to the form of the beads by making such combinations as, three cubes and one ball; a ball, a cube, and a cylinder in one color; or making human beings by placing a cylinder on a cube and adding a ball for a head. A string of uncolored cylinders makes a fine garden-hose, while colored cylinders make famous jars of jelly for the dollies.

OTHER MATERIALS FOR STRINGING

But beads are not the only material for stringing. Nature provides many suitable objects, such as nuts, shells, seeds, berries, and haws. And the gathering of these will help to open the children's eyes to the many wonders so generously strewn about them. To be able to read even a page or two of Nature's wonderful story-book is surely a valuable accomplishment. And the time to begin this study is in early childhood.

A bundle of the artificial straws used in ice-cream parlors, cut in inch lengths, will be a much-prized adjunct to the stringing.

BEAD-STRINGING AND NUMBER

In stringing, the child is constantly making use of different number-combinations and laying up information which will be invaluable when he begins his number work in the primary grade. He knows the difference between three and five, two and four, etc., and has a definite impression to call upon when any simple number is mentioned, and so is saved the laborious work many a little child goes through.

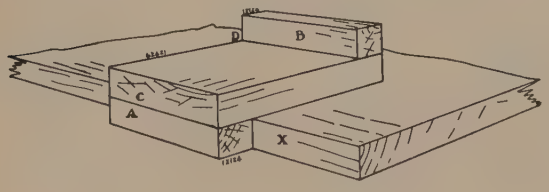
Colored paper, cut in circles and squares and strung with straws, makes a beautiful decoration for nursery or for Christmas tree. Narrow strips of paper pasted in rings and joined together make a pleasing variation.

While to our adult eyes these chains may not be artistic, to the children they are truly beautiful and a source of intense delight.

HAMMER AND NAILS

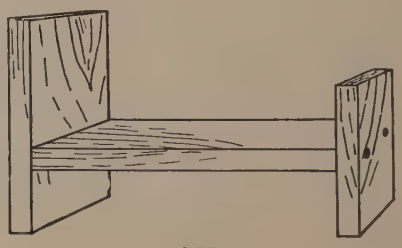
BY MRS. BERTHA PAYNE NEWELL

CHILDREN get a great deal of pleasure in playing carpenter. There is a sense of reality about the wooden toy that is lacking in the things of



BENCH-STOP

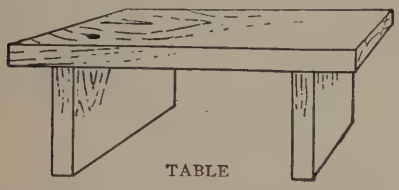
paper. Odds and ends of lumber, the waste from measured lengths, may be bought cheaply at almost any lumber yard. We had a load of this kind put into our cellar for kindling, and Helen and I picked out the best of it to make still more furniture for the doll-house.



BED

TOOLS

We had a hammer, a bit and brace, borrowed from father's tool-box, and a saw of her own with a narrow point. It is a Ball saw, made for this kind of work. We used the back steps for a work-bench. At first Helen held the boards steady while I did the sawing, then she took her



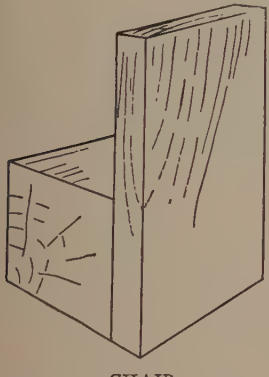
TABLE

turn at the saw. Then I made a bench-stop like the diagram. This helped hold the boards firmly by bracing them against angle D.

A and B are two blocks 2 x 2 x 4 inches. C is a block 4 x 4 x 1 inches. The stop is shown in the diagram fitting over the bench or table, X.

We used small wire-nails, but the wrought-iron finishing nails are better, because they do not bend so easily under ill-aimed blows.

Some of our bits of board were 2 x ½-inch stuff. We cut the wider stuff into two- and five-inch lengths; these worked up into table-tops, bottoms of beds, piano-backs, etc. The square-ended stuff we cut into one- and two-inch lengths for legs.



CHAIR

The furniture was rather rough and homely, and we decided to use a small plane to smooth the pieces the next time. For these we used coarse sand-paper. Some we stained mahogany-color, some oak. White enamel paint would make the bed-room furniture really pretty.

We planned to go to a carpenter-shop and order poplar stock one-third of an inch thick, and make some furniture for her little cousins. This material is soft enough to work easily, and has a good grain and color.

WAGONS

Materials: Cigar box and four flat tape-spools, bits of leather, and wire-nails with good heads.

Place wheels on side of box with hole over edge of box-bottom. Drive a nail through a bit of folded leather, put through hole in spool, and drive into edge of box-bottom. A screw-eye screwed into front makes a superior fastening for the string that pulls the wagon. Large button molds make good wheels, but empty typewriter-ribbon spools of metal are the best of all.

SAILBOAT

Materials: Thin (three-eighths-inch) board about 4 x 10 inches. Dowel-rod eight inches long. Cloth square, 6 x 6 inches. Tacks. Small screw-eye. Glue.

Measure end of board. Find point halfway across the place dot. Measure same distance on other end. Measure a like distance from corners down sides of board and dot. Place ruler from dot at center of end to dot at side of board. Draw a line. Repeat on other side and same at other end. Saw off these two right-angle triangles. Place ruler from point to point of this

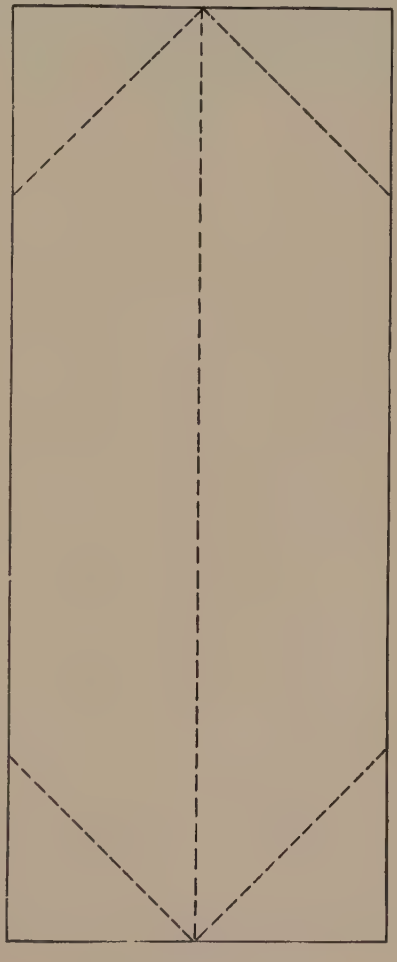


DIAGRAM OF SAILBOAT

board. Draw a line to bisect the angles and connect them. Place a dot on this line three inches from one end. Bore a hole. Insert dowel-rod for mast. Glue it in. Cut square cloth in half, to make two triangles. Fasten one of the straight edges of one of the triangles to the mast with its other straight edge parallel with the boat. Tie a string to the loose corner, and run the string through a screw-eye near the back of the boat.

PLANT STAND

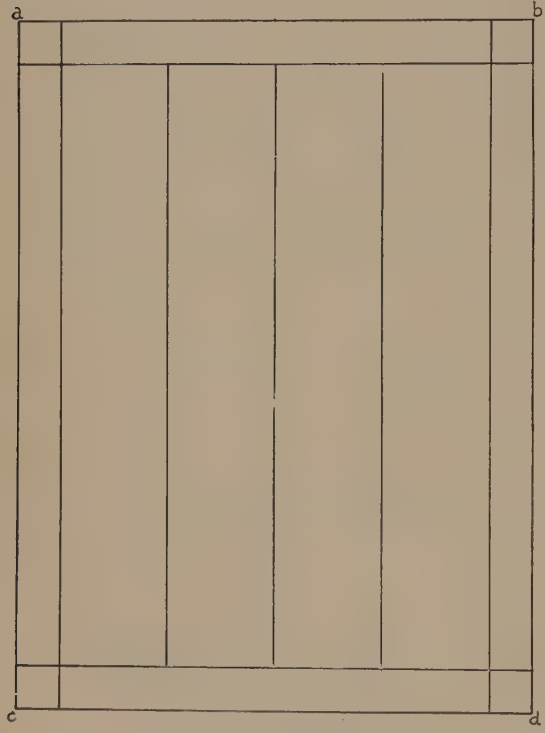
This would make a good Christmas or birthday present for some grown person.

Saw a square from a board 6 inches wide. Saw four cubes from material one-inch square. Nail or glue the small pieces to the corners of the large square, to serve as "feet." Four spools might be used instead of small cubes.

WEAVING

BY MRS. CARRIE S. NEWMAN

THE kindergarten mats would do well here, but as you may not have them I will give the directions that I used for making the mat, which answers to the warp, and the strips, which are the woof, of a paper rug. A five-year-old child who is used to folding and cutting and playing with the rectangular blocks would be able to carry out the directions with a little help.



THE PLAN OF THE MAT

Take an oblong of tough cover-paper 5 x 7 inches.

Place a dot half an inch from each corner on the edges of the oblong.

Connect opposite dots with a pencil-mark guided by ruler.

This makes an oblong within the edges of the paper.

Measure the short edges of this oblong and dot into one-inch spaces.

Connect these dots, making three more lines parallel with the long edges.

Fold short edges of paper together and cut from folded edge on penciled lines (five of them) to short edge of penciled oblong. The mat is ready for strips. Cut these one inch wide and five inches long. They can be woven in with the fingers.

Start every strip *under* the half-inch strip that forms the *frame* of the mat. Then let the first one go over one, under one, and so on. The next strip alternates with it—under one and over one, and so on. The third repeats first, the fourth repeats second, and so on.

Mats may be cut in half-inch strips and woven in the same way, or patterns varied by altering the number-arrangement.

For example, the strips may be drawn over and under *two*. Another time a mat may be woven in *threes*. Another pattern that is easy is:

First strip: over one and under two. Repeat.

Second strip: under one and over two. Repeat.

Third strip: repeats first, etc.

Box Pattern

First strip: over three, under three.

Second strip: over one, under one.

Third strip: over three, under three.

Fourth strip: under three, over three.

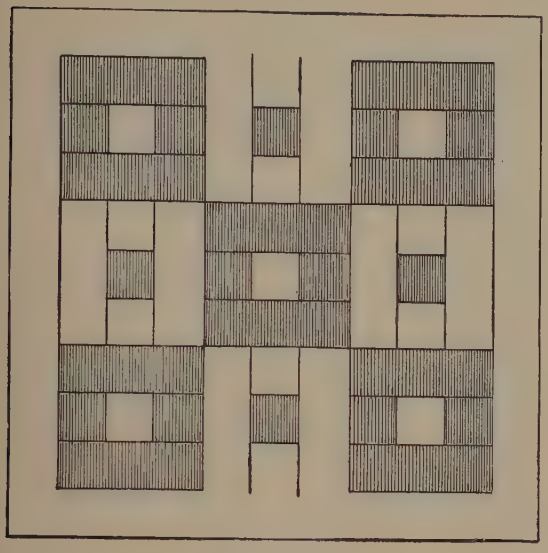
Fifth strip: under one, over one.

Sixth strip: under three, over three.

Seventh: repeats first; eighth repeats second, and so on through to thirteenth, which repeats seventh.

Other patterns can be invented indefinitely. These mats are not only good for doll-rugs but can be converted into many pretty little articles for a child's gifts to others. Calendars can be mounted on them, or one may be lined with pretty

paper and folded corners to center like an envelope, a square of cotton wadding enclosed, with sachet powder or lavender flowers inside, for a handkerchief sachet.



BOX PATTERN

Pretty as these things are, they are frail, and the weaving-idea is better carried out in real textile material, for which a loom is needed.

THE SIMPLEST LOOM

Draw an oblong on a piece of heavy cardboard as directed for a paper mat. Mark off the ends of this oblong in quarter-inch spaces. Punch a hole in each dot. Use hatpin, darning needle, or small bodkin for this, if you have no punch.

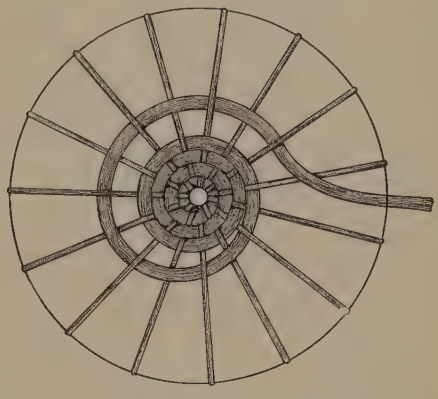
White twine will do for warp; colored twine is prettier. Thread a darning needle with it. Put it through a corner hole. Carry it across to the opposite hole. Make a short stitch on the reverse side of card by putting needle into next hole. Carry thread across length of card as before and continue until holes are all filled. You will have to loosen and pull thread through from hole to hole as you go on with the sewing, for it takes much too long a thread to allow for breaking it off as in ordinary darning. Fasten the thread at the last hole on the wrong side by sewing under and tying to next stitch.

Now the loom is strung and ready for the woof. For a first rug it is best to use short lengths of yarn. Different colors may be used, making "hit and miss" or stripes.

Not all five-year-old children can string the loom in this way, but where there are older and younger in the same family or associated in this work, the older can measure and string the looms for the younger. It is then a contribution to the little ones and is pleasing to both parties. It is fine number-work to do the measuring and drawing.

ROUND RUGS

Little circular cards are to be had at the kindergarten supply-houses punched with one hole in the center and a ring of them around the edge.



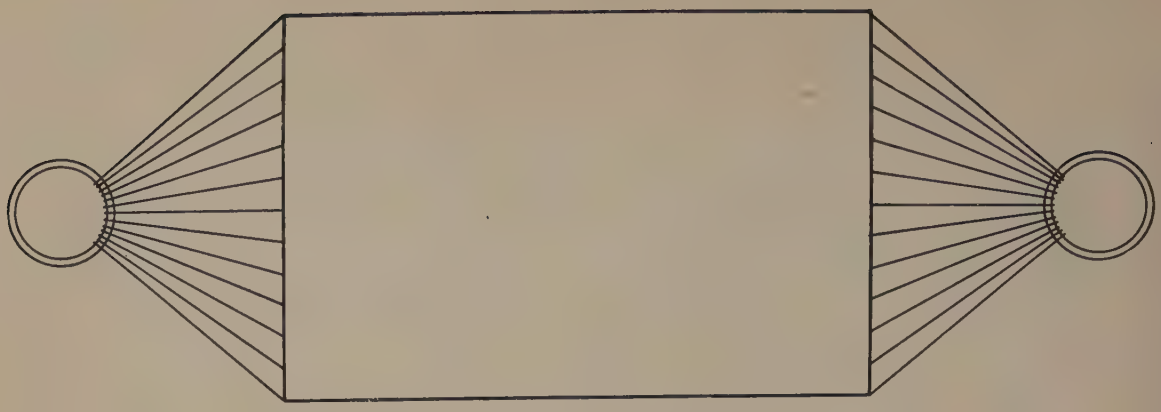
WEAVING A ROUND RUG

If you do not care to order them they can be made at home.

Thread the warp from the outside to the center, making short stitches at the edge on one side. When threaded it looks like the spokes of a wheel on one side. Thread the darning needle with as long a piece of yarn as the child can manage and begin weaving over one, and under one, continue tying new threads on when necessary until margin is reached. Fasten thread and cut or tear card from the weaving.

TAM O' SHANTER CAP

To make a cap, thread round loom with long stitches on *both* sides. Into center, into marginal hole, back to center. Weave (or darn) as before. When one side of card is filled with woof, turn card over, and go on weaving as before until size is reached that fits doll's head. Fasten woof-end. Pass a needleful of thread around the woof strands at center of circle, tying them tightly together. Fasten firmly. Cut ends of warp on reverse side of card and tie in pairs to hold under side of cap in a firm edge, keeping woof from fraying out.

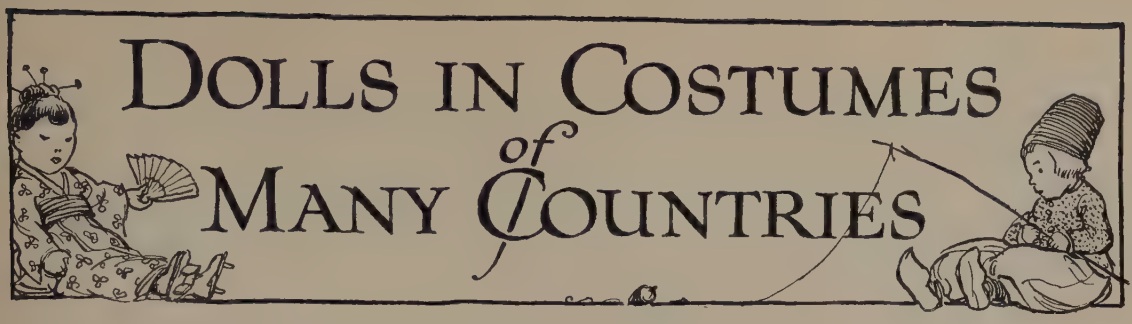


WEAVING A HAMMOCK

HAMMOCK FOR DOLL-HOUSES

Take piece of cardboard and mark as for oblong loom. Fasten curtain ring at middle of each end of card. There must be a space of three to two inches between this ring and the oblong that outlines loom.

Tie a piece of string (warp) in ring. Thread it through needle. Pass it through a hole at end of row of holes. Carry it across to end hole opposite. Put it through and tie to ring at that end. Take another piece of string of same length and do same. Repeat until all holes are filled. Weave as before. Tie ends of yarn that make woof in pairs all down sides of hammock to hold firm. Tear card free and tie a long string in each ring to hang hammock by.



THERE is hardly a little girl who does not own at least one doll; and there are many who own whole families of dolls—father-dolls, mother-dolls, and dozens of doll-children. Usually they all are members of one family, and that family is very much like the real family of the little doll-owner.

Now here is a new idea. Instead of having the dolls all similar, why not dress them like little people of other nations? You may think that this will prove a hard task, but if you follow the directions here given it will not only prove an easy task but a delightfully interesting one. The dolls need not be more than nine inches long.

Begin with a single doll and add others as you can. Take your time for it. Let each little doll-dress be carefully and correctly made and the result will be so charming that grown people, as well as children, will be delighted.

The picture on the next page shows a number of these prettily dressed dolls. We must, however, know more about their costumes than the picture shows; we must know the proper colors and materials to use in making the dainty dresses. The accompanying directions, if carefully followed, will produce charming results.

No. 1. GRETCHEN, THE GERMAN DOLL

IN choosing our German doll we must see that she has long, light hair, almost yellow in color. She should have a plump little figure and pink cheeks.

The German peasant has a special costume which is worn both week-days and Sundays. Its most striking feature is the curious bonnet with its straight front, quite stiff and plain, and full-pouched back. It is plainly shown in the picture. It should all be made of cotton material of two colors. The back part should be white, and the stiff part, which goes round the face, should be pale blue, edged with a tiny frill of white.

When we dress our German doll we must part her hair and braid it in two "pigtails," fastened at the ends with small bows of red ribbon. The soft white lawn blouse is cut rather low in the neck. It is full and pouches just a little over the top of the bodice Gretchen wears. This bodice is made of black velvet, and is a straight band in shape, supported by two narrow strips going over the shoulders. It is laced up at the back.

The skirt is of cloth or muslin; dark blue is a good color. Make it full and gather it into a plain band. It is put on after the blouse; and the bodice, which is a sort of waist, fits neatly over the skirt-band. The apron has no bib, but it has a tiny pocket. It is made of white muslin, with a little ruffle at the bottom. You will notice that this ruffle goes a little way up the sides of the apron.

The stockings are white and the slippers either brown or black, with low heels, broad, and comfortable in shape. The sleeves are small, and finished by a little band which comes just to the elbow. If we can buy or make a tiny hay-rake, our little Gretchen will be completely equipped for her work in the fields.

No. 2. SARAH, THE ARMENIAN DOLL

THE complexions of the Armenian people are olive, the hair black, the eyes dark; and the women are noted for their long lashes. Though their features are large, they are considered a handsome race.

Sarah's costume is of cotton material, for it is hot in her country. The skirt is full and short enough to show her feet. The material should have a well-defined pattern of rich colors. The little waist is tight-fitting, with long sleeves that end at the wrist in a plain little cuff. The skirt is sewed to the waist, which is fastened in front with a few buttons; it has no collar.

Over this dress is a coat that is much like another dress, for it has a full skirt joined to a plain top. The skirt of this coat is shorter than the

figured dress-skirt, as shown in the picture. The sleeves of the coat come only to the elbows; they are finished with a little ruffle of the same material, which, by the way, is a plain dark blue or dark purple cotton cloth.

Over the coat Sarah wears an apron. There is plenty of stuff in the apron, but it is all gathered so closely that it does not cover much of her dress. It is made of white cotton material with wide border of blue or figured goods.

The head-dress is very simple, a bright red square of cotton cloth folded round her head; for this doll represents an Armenian girl whose duty it is to fetch water in the cunning little earthen jar slung over her shoulder by a cord.

Nos. 3 and 4. PIETER AND WILHELMINA, THE DUTCH DOLLS

Before we begin to dress these dolls, let us look at their pictures very carefully. Let us commence with Pieter, whose costume is very easy to make because it is loose and comfortable as well as warm. He wears extremely baggy trousers reaching to the ankles. These should be made of dark blue cloth, and cut very full. His short little coat is of dark gray cloth, and is buttoned up to the neck. Underneath is a red striped waistcoat, the collar of which can be seen just peeping above the little coat. At the waist are worn two silver-colored buttons, always of large size. At the throat the red waistcoat is fastened with two tiny gilt buttons, while the buttons that fasten the coat are supposed to be of silver. The buttons of a Dutch boy are his jewelry, and he is very proud if his clothes are well ornamented with them.

Pieter's thimble-shaped hat is of cloth or felt, and fairly tall, but with no brim. It must be made to fit properly. It is worn on the back of the head with an almost rakish air.

Sometimes wooden shoes—sabots, as they are called—are for sale in toy-shops. If these cannot be found, possibly skilful fingers may fashion them out of cardboard cut and glued into shape. These are rather difficult to make. Pieter must have light hair, short and straight. He must have a healthy, rosy complexion.

The little Dutch girl, Wilhelmina, wears a cap of white lace or embroidered muslin. It fits tightly on the head, and has wide side-pieces, which turn back from the face and form flaps, or "wings." These caps are stiffly starched to make the wings stand out, so we must make our doll's cap of stiff muslin. If we use lace for it we must insert a fine wire at the edge.

The little waist, of flowered material, is tight-fitting, with elbow-sleeves. It is cut square in the front and worn with a chemisette of white. The square-cut neck is bordered with a band of some plain color. The apron should be of white or blue with a strip of checked material at the top. There is no bib to this apron, which is on a plain, narrow band buttoning at the back. The sabots should be the same as those worn by Pieter.

While most ladies prefer to look slim, the Dutch lady, to be really well dressed, must look as large as she conveniently can, and the more woolen petticoats she wears the more is she pleased with her appearance; so do not be afraid of putting too many skirts on our flaxen-haired doll, Wilhelmina. Her skirt should come to her ankles and the petticoats be of the same length. Round her neck she should wear several rows of coral-colored beads held together by a tiny clasp.

There are many peculiar costumes worn in Holland, some of them much more elaborate than those described; but they are all more or less alike in some respects.

No. 5. IVAN, THE RUSSIAN DOLL

Beside Wilhelmina stands little Ivan, the Russian. For this let us buy, if possible, a boyish-looking doll with short, light hair.

As Russia is a cold country, we must dress Ivan in fur. But first he must wear a navy-blue sailor-suit such as other small boys wear, and to this must be added a pair of top-boots made out of soft kid or thin leather of the shape shown in the picture. But little Ivan will need an overcoat, and the picture shows that it must be trimmed with fur. Still, as fur would be clumsy on so small a garment, we can easily substitute a little Canton flannel or any other cloth with a long, furry nap. The collar, cuffs, coat-lining, and cap should all be made of this "fur." Tiny "frogs" of narrow black braid can be added at the front, as shown in the picture.

No. 6. DOLORES, THE SPANISH DOLL

The country of Dolores is often called "sunny Spain," because the climate is warm, bright, and full of sunshine. People who live in hot countries appear to love bright colors, so the Spaniards are fond of gay, glowing hues, and therefore little Dolores must be gaily dressed. She must have dark hair, and it must be "done up" quite high, as shown in the picture, with a tiny red rose coquettishly placed at one side.

ANNE. P
ANDER.SON
THE-POOR
INVALID

Spanish girls are fond of little silk shawls, so for our doll's shawl we must get a square piece of soft silk, brightly colored—brilliantly, in fact—for it needs an orange ground with red and green flowers on it, or else a pink ground with a small pattern in purple, deep red, and blue. Sew fine black silk fringe all around the edge, and the shawl is made. We must fold our shawl from corner to corner and put it round the doll's shoulders, as shown in the picture, crossed in front, with the ends tied loosely behind. The fringe, you notice, is quite deep in proportion to the size of the shawl. The throat should be decorated with one or two rows of colored beads.

The skirt, which is short enough to show the ankles, is of an ordinary shape but made with a ruffle on the bottom, or rather with a series of little box-plaits.

The stockings are white, the shoes black, held on by the pretty little cross-gartering, which can be made of narrow black ribbon. Fix an end of the ribbon to each side of a shoe, then bring the ribbon round and cross it back and forth.

The cotton apron is striped in several colors—blue, green, and red, or perhaps pink with delicate purple stripes; certainly, it must be very bright.

Usually a Spanish girl will wear a lace scarf, or mantilla, to drape the head and shoulders. It looks very charming, but it is not worn with the fringed shawl. At a place of amusement it takes the place of a hat.

No. 7. GRETA, THE SWEDISH DOLL

Next we come to the little Swedish doll, whom we call Greta. Though Sweden has a warm summer, its winters are long and cold, which explains why warm clothes are typical of this country. The girls and women are very industrious and fond of fine needlework with which to decorate their clothes. They make delicate little patterns on the children's caps and bonnets and think nothing of embroidering a child's coat all over. All of their household linen is beautifully embellished with skilful handiwork. When Swedish ladies go out to tea they frequently take with them a bit of embroidery to do, and the work done by some of the children might put older people to shame.

As the picture shows, Greta wears a little white blouse of fine muslin gathered into a straight neckband; a vest of red and black striped silk, fastened in front with tiny gilt buttons. If the striped silk is not easily found, the right effect may be produced by using red silk on which black lines have been made either by embroidering them or by sewing on black braid.

The jacket is made of dark, bluish-green cloth; and here comes in the embroidery, which covers it in a pattern composed of triangles and lines—not at all a difficult one to copy. It is worked in black wool, the triangles filled in, and the lines outlined. It will be found far easier to cut out a plain, tight-fitting shape, and embroider it, before putting it together, than to put the coat together and then embroider it.

The skirt is full, made of black cloth, with a band of scarlet cloth around the lower edge. The apron is dark blue, and not of cotton material, as we might expect it to be, but of cloth. On the cloth is a pattern of fine white lines, which may be made by white threads run evenly through the surface of the cloth.

The little pocket, suspended on a red silk cord, is a fascinating detail. The pocket is dark blue or red at the back, with a white front forming the pouch. This white portion is ornamented with a square cross of red cloth sewed on with white thread; the stitches show, and form white spots or crosses round the edge of the red cross.

The cap is a marvelous combination of color; but copy it carefully. It is of bright red satin with yellow and blue flowers and leaves embroidered on it. It is somewhat pointed in front, and shows the hair well at the back. The little slippers are black and the stockings are white.

No. 8. HENRIETTE, THE FRENCH DOLL

French women are noted for their good taste in clothes, and the little French girl always looks very neat. The rich like to dress their children elaborately; their little frocks are beautifully made. So we must dress the French doll, Henriette, very daintily.

The dress should be of light blue silk, and under it should be worn very full petticoats, generously trimmed with lace. The sash, of plaid silk, with fringed ends, is worn a little below the waist-line. The hat is of puffy white mull trimmed with cunning little bunches of blue ribbon, to match the dress.

Little children in France wear short white socks and pretty boots of patent leather, with tops black or tan in color. Henriette must wear tiny pearl beads round her neck, or perhaps a string of little pale coral-colored beads. She should wear one or two gold bangles on her arms and a little bow of blue or black ribbon in her hair. She should carry a cunning little parasol.

For a French doll we must choose one with a pale complexion and dark hair.

No. 9. PANNA, THE HUNGARIAN DOLL

As in nearly all of the European countries, it is only the peasants in Austria and Hungary who still wear the national dress. Our little Hungarian doll should have a round face, pink cheeks, and brown hair.

Her cap or bonnet is one of the prettiest headdresses imaginable. It is made of white or cream-colored linen, and beautifully embroidered in the brightest red, green, and violet silk that it is possible to buy. The shape of the cap is very simple, for it is made of two straight pieces of material.

The embroidery on this cap must receive special attention if we wish to make it really characteristic of Hungary. To succeed in this we must arrange, in some pattern having few angles, a number of bean-shaped figures. These should be worked in geranium-red and pinkish red. These colors are not often combined, but they look quite charming on our little Panna. Parts of the design must be filled in with violet and a soft, grayish green. The background must be filled in with red so that no material shows—just a solid mass of embroidery. A tiny ruffle of light, tan-colored lace must edge the cap.

For the skirt and blouse white washable material is used, embroidered all over with the same figure, repeated again and again. For this part of the costume a simple cross-stitch is used, and the colors are black and red. In the picture you will see how the pattern is arranged. Skirt, blouse, and sleeves are rather full; the sleeve is finished with a little ruffle of lace at the wrist.

The coat, which is plain in shape and without sleeves, is made of dark blue cloth lined with red silk. The edging of the coat is a strip of white cloth "pinked" to form a border, and sewed in between the coat and its lining so that only a narrow edge shows. There must be two rows of tiny buttons on the coat, silver-colored and very bright.

Perhaps the coat may best be described by calling it a sleeveless Eton jacket, for it reaches only to the waist-line. It is a jaunty little garment, even though the outside is of sober blue.

The little apron matches the dress in color and material, except the border that edges it, and which appears again just inside the embroidered figures. The sash is of bright red woolen material, and the necklace is a double row of beads, black and red threaded alternately.

No. 10. LOTUS BLOSSOM, THE JAPANESE DOLL

The costume worn by the little Japanese girl is one of the most beautiful in the world. The Japanese are famous artists and can make lovely objects out of the simplest material. They have a great love of color and know how to blend colors with wonderful skill. We shall find their clothes made from almost straight pieces of material. We shall also find the colors very beautiful and well arranged. Nearly every city of our own land has one or more stores in which Japanese goods are sold, and it will be easy to find in such a store a doll that really comes from far-away Japan, with smooth black hair, slanting eyes, and tiny feet. In the same store Japanese chintz can be bought, and half a yard should make little Lotus Blossom a charming kimono. Nothing could be simpler in shape than a kimono, a pattern for which may be made as follows: cut out a piece of paper 4×8 inches; then cut out two more pieces, each $2 \times 4\frac{1}{2}$ inches. Place these smaller pieces, which are for the sleeves, at the upper part of the larger piece, so that the straight line across the top, including the sleeves, measures eight inches. This block-shaped outline will, if made of chintz doubled over, form a little kimono.

The front and back of this garment are alike, except that the kimono opens in front; so we must sew it together down the sides and cut it open in the front. The wing-like sides are the sleeves and the lower portions of these roomy sleeves are sewed so as to form large pockets. The neck may be cut out a little, in order that it may fit easily, and if a straight band of some plain material goes round the neck and down both sides of the front (where the garment opens) the effect is very pretty indeed.

The sash may be of some rich material, brocade or gold.

The Japanese girl is very particular about her sash and the way it is tied. It should be wide in front and at the back it should have one loop going up and another going down.

To dress the hair of a fashionable Japanese girl takes at least two hours, so it is not surprising that the task is not repeated every day. One dressing is expected to last for two or three days. Of course a hat would spoil this elaborate arrangement, so no hat is worn in the street. A paper parasol is carried, however, and it will be easy to find a tiny paper parasol for Lotus Blossom, as they are for sale in all Japanese stores and cost five cents or less.

DOLLS IN COSTUMES OF MANY NATIONS

1. GERMAN DOLL; 2. ARMENIAN DOLL; 3 AND 4. DUTCH DOLLS; 5. RUSSIAN DOLL; 6. SPANISH DOLL; 7. SWEDISH DOLL; 8. FRENCH DOLL; 9. HUNGARIAN DOLL; 10. JAPANESE DOLL; 11. EAST INDIAN DOLL; 12. ESKIMO DOLL; 13. ITALIAN DOLL

No. 11. CHANDI, THE EAST-INDIAN DOLL

For our next costume we must go to distant India. In the picture is represented a nurse-girl, or "ayah," as she is called. Chandi has bare feet; she would not wear shoes in the house, for that would be considered very rude. When in the street she would wear a pair of loose slippers without heels.

The dress is of yellowish-white cotton material, very soft in texture. The waist comes to the belt, and even a little below it. The waist is quite plain in shape, buttoning in front with three pairs of small buttons. The sleeves are plain and fit tightly to the arm, but reach only to the elbow. A piping of scarlet cotton cloth edges the neck, the sleeves, and even the bottom of the waist, which hangs a little below the belt. Little Chandi is very fond of decorating her costumes with a piping of some bright color. The skirt, of the same material as the waist, is very full and is plaited thickly into a waistband; it is cut short enough to show the ankles.

Now we are ready for the outer part of the costume, the drapery that almost conceals the little figure. It is simply a strip of white material bordered with red. This is draped around the figure and over the head, taking the place of cloak and hat. To arrange this drapery we must start by tucking in one end at the waist in front; then we must twist it round over the back of the head and bring the other end over the left shoulder. The ayah holds this in position with her hand as she walks.

Chandi wears many metal bracelets, and on each ankle a metal anklet. A heavy piece of metal jewelry is worn round the neck. She also wears large earrings, so heavy that they have to be held on by chains which go round the ears. Her hair is black and shiny and very straight; it is parted, brushed snugly down behind the ears, and wound into a tight little knob at the nape of the neck.

Chandi must be a little brunette doll.

No. 12. AHWEAH, THE ESKIMO DOLL

We all know where the Eskimos live, near the north pole, where it is almost always cold and where the winters are long and dark. It will not be hard for us to guess how these people are dressed. Of course they are wrapped up in furs, for nothing else would keep them warm enough. The Eskimos are small and strong and rather plump. Their complexions are dark and they have broad, flat faces, with eyes that slant in a way that reminds us of the Japanese.

The strangest thing about the Eskimo costume is that men and women dress alike, for both wear coats, trousers, and boots. The garments are quite plain in shape, and ornamented only with a white skin, sewed into the front of the jacket, and white cuffs. A pointed white hood is worn.

Like our little Russian, Ivan, our Eskimo must be warmly clad; and we may find a good substitute for fur in some material that has a long, silky nap. The little trousers are tucked into boots that may be made of discarded kid gloves, heavy in texture. The doll's hands are covered with kid mittens. An Eskimo girl's hair is very straight, jet-black, and braided in two braids. The Eskimo boy has his hair banged, or cut in a straight line across his forehead above his eyebrows, but at the back of his head it grows quite long, just like his sister's.

No. 13. FILOMENA, THE ITALIAN DOLL

In Italy, as in Hungary, we shall find a distinctive costume only among the peasant class. The dress that little Filomena wears is one that would be worn by a little fisher-girl. We must, if possible, have a doll with dark hair, an olive-tinted complexion, and pink cheeks.

The pretty little head-dress is red, with an orange and blue border. The blouse, of fine white lawn, is simply made and gathered at the neck into a narrow band. The sleeves are long and full and are finished with a narrow cuff. The full skirt is of the same material, trimmed at the hem with two rows of bright scarlet braid.

The bodice, which is quite a feature of all Italian peasant costumes, is of black velvet and fastened together with red lacings. For these, tiny eyelet-holes should be made. The stockings are white, and the boots are of soft leather; an old pair of tan-colored kid gloves furnish the best material. Coral-colored earrings and necklace complete this dainty costume.

So much for the dolls shown in the picture. How many girls will have the skill and patience to dress a family of dolls such as are here described? How many of you will forget all about these dolls till some day when you are invited to a fancy-dress party?

Then, if you have so forgotten, perhaps you will recall what we have told you here. On turning again to these pages, you may find exactly the costume you wish to copy; then off you will go to the party, delighted that you can go suitably and prettily dressed.

SELF-DIRECTED WORK AND PLAY

By JENNIE ELLIS BURDICK, BONNIE E. SNOW, MARY LENA WILSON, DAWN POWELL GOUSHA, AND OTHERS

With Illustrations by Hugh Spencer

Busy Mother. Restless child. Mother has already had so many interruptions she dares not lay aside her work and play with her little one. A whine: "Mother, I have nothing to do—nothing to play with." Mother struggles between duty and joy and feels in thorough accord with Rebecca of Sunnybrooke Farm when she wrote

When joy and duty clash
Let duty go to smash.

Then, with a sigh, she remembers that Rebecca's stern teacher obliged her to revise her couplet to

When joy and duty clash
'Tis joy must go to smash.

Mother heaves an echo to Rebecca's sigh and—

It is at just this point that this section of this book comes to Mother's assistance.

SCRAP-BOOKS

Two pieces of paste-board of any desired size—9 by 12 inches to 15 by 20 inches, according to the individual preference—may be covered with muslin to serve as backs for the scrap-book. Coarse brown wrapping paper or muslin is then cut in pages fitting the paste-board binding and holes made to permit the passage of the ribbon serving to hold the pages together. For paper dolls, a large book is necessary to allow for the difference in sizes of the dolls. The same is true of the general scrap-book where the child pastes anything that happens to appeal to his fancy—a bright-colored magazine cover, a colored print, animal pictures, or pictures of children. The kiddy "who knows his letters" can have a scrap-book of children's stories which his mother finds in the daily newspapers. Frequently there are newspaper or magazine drawings which he can paste in his book and trace by means of tissue paper and a drawing pencil. Making and playing with the scrap-book provides an entertainment that is clean, leaves little or nothing for the patient mother to tidy up afterward, and requires sufficient concentration to keep the little hands busy for two or three hours at a stretch.

A SCRAP-BOOK

GAMES WITH THE BUTTON BAG

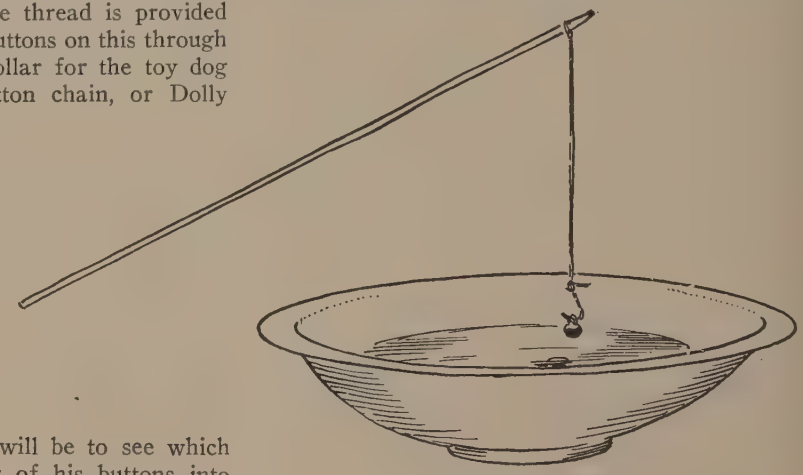
THE button bag is sure to afford amusement for the older children as well as the tiny ones. The babies of two or three will find considerable pleasure in matching up the buttons, seeing which one can get his supply of buttons matched first,—

BUTTON-FUN

the large ones here, and the smaller sizes in graduated rows. For the four or five-year olds chain-making is the thing. Coarse thread is provided and the kiddies string their buttons on this through the eyelets. Sometimes a collar for the toy dog can be made from the button chain, or Dolly adorned with a handsome button necklace.

A tumbler, a few large buttons and a larger supply of smaller ones form the equipment for a game of tiddledywinks. The larger buttons are used to snap the smaller ones into the glass. If each player has a supply of buttons of a certain pattern or color, the game will be to see which can get the largest number of his buttons into the glass. The winner takes all the buttons.

Shoe buttons make amazingly fine fish if little Johnny wants to go a-fishing. The "fish" are released in a basin and Johnny with a fishing-pole made of a drumstick, piece of kindling, or any other stick about a foot and a half long, sits by the basin waiting for a nibble. On the end of the stick a string is attached with a bent pin on the end. The button fish will be found to be very partial to bent pins and bite readily, so that in a short time Johnny will have several fine catches.



BUTTON FISHING-POND

DOLL'S APARTMENT MADE OF DOMINOES

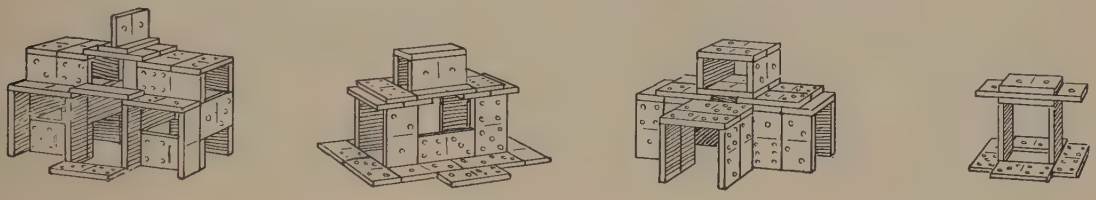
BUILDING a doll's apartment of dominoes will keep both the boys and the girls busy. For, though the boys may not deign to play with dolls, every one of them is interested in making houses. And as for the girls, they will gladly try their skill at building just to show the boys they can do whatever their brothers do.

The making of the house is very simple. The

dominoes are merely laid one on top of the other until the house is the desired height. But putting in the windows and doors requires greater ingenuity and a whole afternoon can be occupied in designing different kinds of houses—some low with short, wide windows and doors; others high, with long narrow openings; and still others with doors on the side, or French windows opening down to the ground. If Mother has the time, she can show them pictures from which to model their buildings.

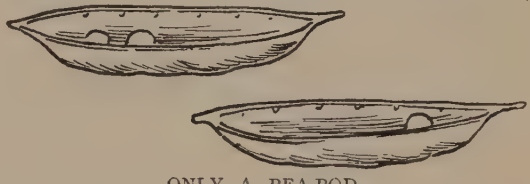
Porches can be indicated by a single row of dominoes around the outside of the house, running lengthwise and either with or without a top, as the young architect wishes. Paths, winding and curved, will add to the effect if there are enough dominoes left.

With these same dominoes the children may also make a single room of larger dimensions and build tiny pieces of furniture for the doll inmates. By laying the dominoes across each other at right angles, and standing them on their side or on end, quite effective tables and chairs and beds can be built. In one way or another the children are sure to be kept out of mischief with these little building blocks.



BOATS OF PEA-PODS

THERE never was a boy or a girl who did not love to sail boats—in a pond, in a puddle in the back yard, or even in the bathtub or washbasin if there were no other place. But boats are easily destroyed, and it is not always possible to have a supply on hand. Here is where the cast-aside pea-pod renders valiant service. Split open the pea-pod and each half makes a little green canoe which will sail beautifully about the bathtub helped on by a tiny finger. By pricking a hole in the pod and tying a piece of string or thread to it the small boy or girl is not so likely to get his clothes wet as he can pull it from a safer distance. If the children are imaginative,



ONLY A PEA-POD

they can leave a few of the peas in the pod to act as passengers in the boats.

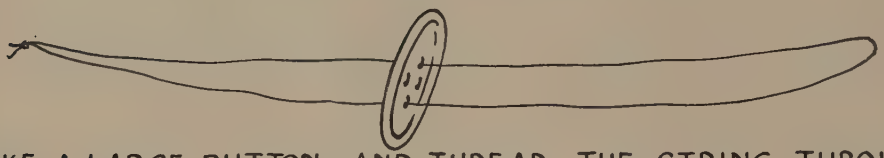
BOATS OF WALNUT SHELLS

FOR the little tot of two and the boy of fourteen the boat has an endless attraction. Sometimes a toy-ship is not among the child's playthings, and

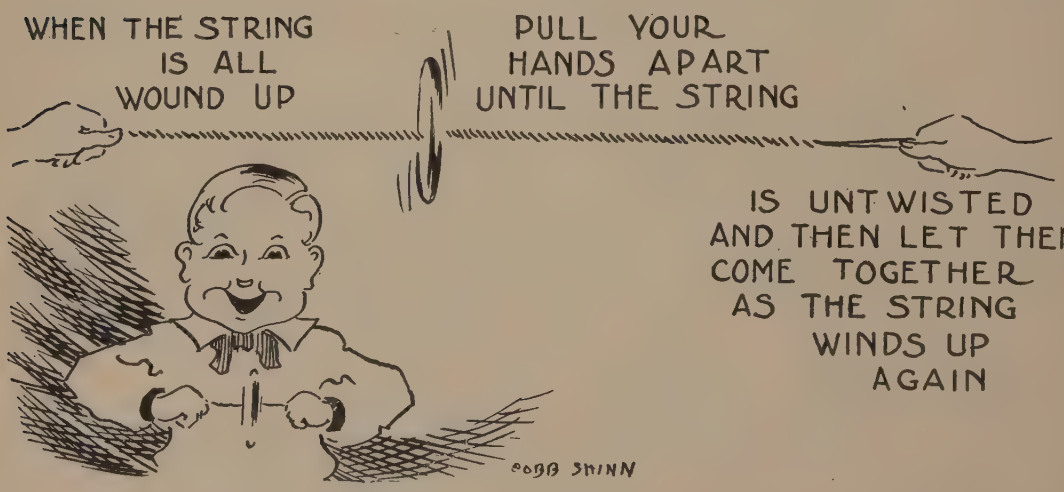
NUTSHELL FUN

then Mother must improvise something to take its place. Walnut shells can be used as effectively as anything else for this purpose. One or two matches of unequal heights can be stuck upright in the shell by means of sealing-wax, a bit of modeling clay, or even chewing-gum, and the sail, of a tiny piece of tissue or gauze, is attached to these. A small flag can be erected at the masthead and then the little craft set to sail in a basin of water. If Mother makes one, the child can copy her model and make a whole fleet. Instead of a mast the child may put a crew of matches in the ship—one match to a shell, of course, and in one may be a Fairy Princess composed of a toothpick wrapped in a scrap of colored crêpe paper. As the "match people" do not sit well of their own accord, gum, clay, or sealing-wax must be used, as in making the masts, in order to insure a safe voyage.

A Dandy Plaything
Made with A Button and A String



TAKE A LARGE BUTTON AND THREAD THE STRING THROUGH IT


WHEN THE STRING IS ALL WOUND UP
PULL YOUR HANDS APART UNTIL THE STRING
IS UNTWISTED AND THEN LET THEM COME TOGETHER AS THE STRING WINDS UP AGAIN
BOBB SHINN

THE EASTER-EGG HUNT

WHETHER he has outgrown the idea that Bunny really laid the eggs or not, every child loves the

THE EASTER BUNNY

Easter-egg hunt. The eggs are boiled and colored the day before Easter, and a number of chocolate eggs and small Bunnies purchased to lend variety to the Easter-egg nests. Then Mother hides one large egg, a tiny Bunny and a half dozen or so small candy eggs in various corners of the house, —behind a bookshelf, in a vase, behind the curtain on a window-sill, in a dresser drawer, in the pantry shelves, behind a photograph on the library table, in the sewing basket, in little Mary's doll cradle, and in Tommy's tool-chest or Jack-in-the-box. Early on Easter morning the children are given baskets to go on their hunt. Sometimes the Easter Bunny has left a merry rhyme under one of the eggs, with a warning for Tommy to be a good boy if he wants to be remembered next year by the Easter Bunny. Behind the piano or in some particularly unexpected spot a large Bunny is hidden and it is a lucky child who finds this, for it is his for keeps, unless Mother, to avoid the spirit of rivalry that its possession is sure to produce, decides that it is to be given by the finder for the decoration of the play-room.

CORN-COB HOUSES

THE old log cabin is one of the romantic things in American history. As soon as the boy or girl is old enough to be read to, he hears the story of the pioneers and other heroes who came from the rude log cabin and it holds a very dear spot in his heart. So, when Mother tells him he can make a log cabin of his own, he is sure to be delighted. A heap of corn-cobs from the barn or the attic or cellar and he has the material for his miniature house.

The building of the log cabin is very simple. Each cob represents a log and its rough surface enables it to stick to its neighbor so that once the houses are built they do not easily fall down. If the children like building especially, they will take great interest in constructing beautiful cabins with many windows and doors which will occupy a considerable amount of time.

For the bigger children, once they have made their cabins, it will be great fun to have little wars, seeing who can destroy the other's cabin first by throwing a ball at it or firing paper wads or some other form of homemade "safe-and-sane" ammunition.

THE COB HOUSE

BY KATE PUTNAM OSGOOD

WILLY and Charley, eight and ten,
  Were under the porch in the noonday heat;
I could see and hear the little men,
  Unseen, myself, in the window-seat.

Will on a cob house was hard at work.
  With a zeal that was funny enough to me.
At eight one has hardly learned to shirk;
  That comes later,—as you will see.

For Charley, by virtue of riper age,
  Did nothing but stand and criticise;
His hands in his pockets, stage by stage
  He watched the tottering castle rise.

"And now, after all your fuss," says he,
  "S'posin' it tumbles down again?"
"Oh," Will answers as cool as could be,
  "Of course I should build it better then."

Charley shook sagely his curly head,
Opened his eyes of dancing brown,
And then for a final poser said,
"But s'posin' it always kept tumblin' down?"

Will, however was not of the stuff
At a loss to be taken so.
"Why, then," he answered ready enough,
"I should keep on building it better, you know."

And, seeing the wise world's wisest knot
Cut at a stroke with such simple skill,
Older people than Charley, I thought,
Might learn a lesson of Master Will.

CORN-COB DOLLS

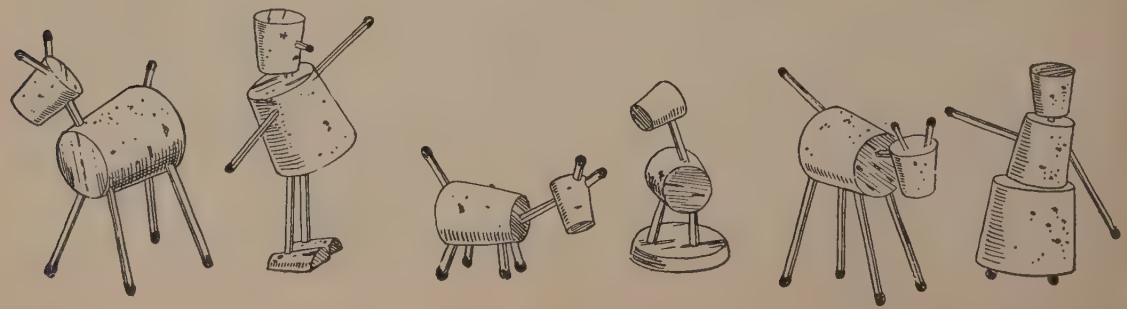
Corn-cobs, a basket of husks, the scrap-bag, and a needle and thread are all that is necessary to create any number of dolls, if the little girl is clever with her fingers. A piece of white cloth is tied over the large end of the cob, on which the nose, mouth, and eyes are marked with pencil or black crayon, and perhaps rosy cheeks painted on with red crayon. A wig of beautiful blonde or brunette hair is made from the corn silks, the ends being tied switch fashion and pinned to the left "temple," and then wrapped in loose strands or braids around the head. The body of the doll being complete, husks of one size are then selected for milady's gown. The smaller ends of the husks are brought together for the neck, and the pieces sewn together, sloping down to make a full-flared skirt. Then the top of the garment is tied around the doll's neck with a bit of colored cord or ribbon. Red or yellow crêpe paper sometimes makes an attractive petticoat although the corn-husks themselves will serve this purpose just as well.

A CORN-COB BABY

TOYS OF CORK AND MATCHES

With a few old corks taken from the row of empty bottles in the medicine closet and a box of safety matches, Mother is prepared against the rainiest of rainy days. For, provided with these simple toys, the children can be kept busy and interested the whole afternoon.

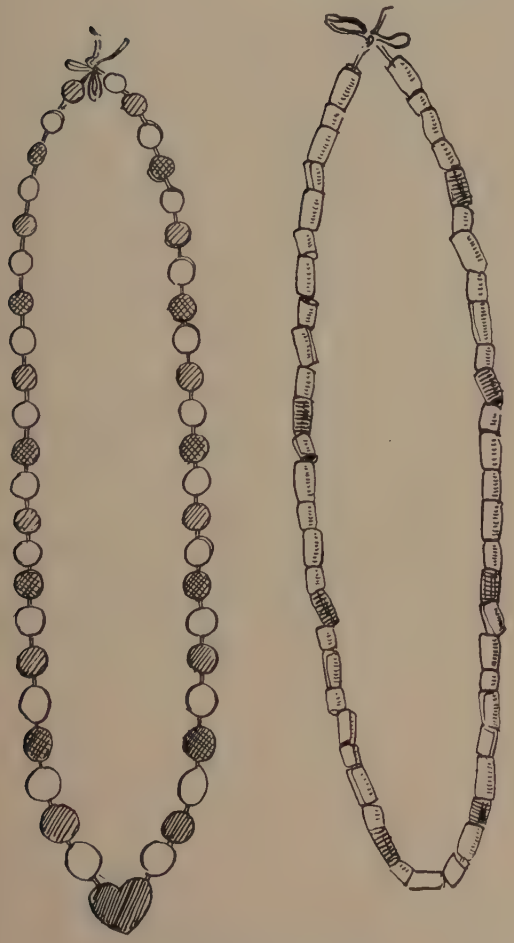
First, there are people to be made out of the corks and matches. The corks make the bodies, of course, and the matches the arms and legs and the very tiniest corks the heads. By breaking off small bits of the matches, eyes and nose and mouth can be stuck on the little cork face. Mother



must always be careful that the matches used are either safety matches or that they have already been lighted.

If the children are inventive and interested in making things, they can have a contest seeing who can make the most objects from his supply of corks. Vases with matches for flowers sticking from the top; lamps with a cork for the base and another for the shade joined by a stem of matches; trees and any number of familiar things may be made from a clever combination of these articles. If Mother suggests a few, the children are sure to think of many more. Free play for childhood imagination makes better-equipped men and women.

PAPER NECKLACES



PAPER NECKLACES

Little girls are never so happy as when they are creating something for their personal adornment, and the making of paper necklaces is sure to form a pleasant occupation for a rainy morning or afternoon, when Mother is too busy with household duties to do more than start the game. A few sheets of colored paper, a heavy string, scissors, and paste form the equipment, and the child sets to cutting up discs of graduating size, doubling the paper so that there is a pair of discs in each size. The diameter of these may vary from half an inch to an inch and a half, with one large oval or heart-shaped paper for the pendant. The string should be long enough to slip over the head easily, possibly being doubled. The discs, beginning with the smallest ones for the back, and being arranged according to color—variation adding to the attractiveness—are pasted on, one on each side of the string, edges even, with a tiny bit of paste. In the middle is suspended the heart or oval, also cut double—this being pasted on at one end instead of the middle, as the discs are.

Another way of making the necklace is to cut the paper in oblong shape, about three-quarters of an inch wide, and a quarter of an inch to an inch and a half long. The long edges are pasted together, forming a narrow tube, through which the cord is drawn. With this necklace, as with the other one, the colors may be arranged in contrasting order to give a gay appearance.

Long, narrow strips of paper can be rolled up like miniature rolls of matting. Paste down the loose end and thread the string through the center opening. Strips cut from remnants of wall-paper lend themselves very prettily to making this style of chain, if rolled with the design side outward.

DRESSING UP

And now we come to the nicest game of all—the game that has made boys and girls happy as far back as great-grandmamma can remember and probably further. It is the game of DRESSING UP. Every wise Mother has stored away, somewhere in an old trunk in the attic or in the spare room, a heap of old dresses and suits that have been worn by aunts and uncles and grandmothers and big sisters and brothers and are long since out of style. But styles mean nothing to the chil-

dren, and what a revel they can have poking over these old things, picking out those they want, and finally dressing up in them and parading all over the house and yard and even the block! How the little girls love to hold up their trailing robes and with what a grand air the small boys balance their stovepipe hats and plunge their hands into the pockets which come below their knees!

But even when there are not these supplies of dresses and suits, there are always scraps of cloth, scarfs and shawls which lively youngsters will seize upon and make into fantastic costumes in which they delight to show off.

The older children of seven and eight will frequently like to imitate favorite characters in stories or in real life. Little Margaret, in a faded crimson shawl, may be the Queen of Sheba about whom she has heard in Sunday-school and Jack may easily fancy himself Jack the Giant Killer or General Pershing, or his most adored uncle in one of his big brother's old uniform coats. By encouraging this tendency Mother will not only provide entertainment for the children for many a long afternoon or holiday, but will arouse their interest in the famous characters in fiction and in history about which they will later wish to know. The possibilities for dressing up are, indeed, almost limitless and if only the children are cautioned to be careful of the more precious garments, a great deal of the care of the small boys and girls will be taken off Mother's hands in this way.

A USE FOR CAST-OFF GARMENTS

QUOITS

Everybody who has ever been on a picnic knows that there is no more popular game than quoits. All the very small boys look on enviously while their fathers and big brothers toss the horseshoes over the stake and long for the time when they will be big enough to play too. And all the little girls are sure that they could play it if only given the chance. And Mother can give them the chance.

A ball of heavy twine, or a bunch of it taken from the box where cords from bundles are carefully put away for future use, and a cardboard mailing tube will answer in lieu of horseshoes and stakes, and will also make it possible to play the game either in or out of doors. The string, if braided into heavy strands—and this will take up a great deal of time on a dull day—will do very well for quoits and will be light enough for even the very little tots to toss. With these in place of iron rings, there can be no danger of small toes being hurt or knees skinned when the tosser takes a poor aim.

A QUOIT RING

The children stand on the firing line, which can be marked by chalk or a string line or a tick, and throw in turn at the mailing tube, the object being to get the string ring around the tube. This

counts ten, but as only the expert tosser or the very lucky one does this very often, it is well to mark a second and third circle about one and two feet from the tube which will count five and three respectively for the quoits falling within its limits. In this way a very interesting contest can be held. If all tossers make an equal score, the one being nearest the stake in each instance will receive one extra count, thus winning that particular throw and putting him one ahead on the final score.

For the littlest tots, who could not keep score, the one who gets nearest the stake will be the winner on each throw. This will amuse them quite as much and keep them interested for a long while.

CLOTHESPIN DOLLS

A WRITER once observed that if nature had not already provided for babies, little girls would invent them. At any rate little girls manage to find possibilities for doll-babes in every possible object. Clothespins are as easily manufactured into dolls as anything, and the mother who provides her small daughter with a half dozen of these household articles, some crêpe paper and a ball of string is sure to find little Mary with a whole family of dolls when she next looks in on her. The crêpe paper is in gay colors, preferably, and tied with a ruff effect around the "neck" of the pin. A hood of the same or different-colored paper is made from a small square, all four corners gathered around the neck by a string. Features are then painted in on the little wooden face with pen and ink, or if Mother does not deem it safe to leave the ink pot with the child, a pencil or colored crayon will serve the purpose. The Father Doll may be provided with trousers by using the forked ends of the pin as legs, tying the trousers around the middle of the pin, and using a black paper as a coat, tied around the neck. Hair can be penciled in on the flat clothespin top.

The Mother Doll may easily be provided with a train on her dress, and the little dolls with sashes either of string or paper. A maid can have a scrap of white paper to serve as an apron tied around her waistline.

POTATO TOYS

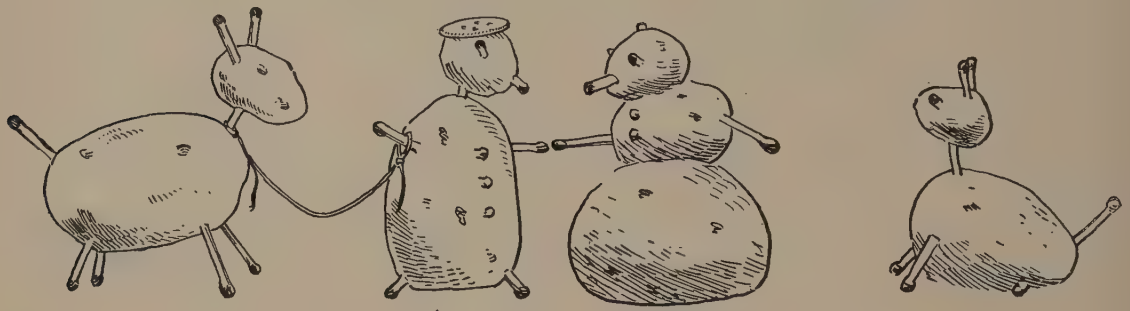
EVERYBODY knows that potatoes are good for children to eat, but many people are unaware that they are also good for children to play with. With a few toothpicks or matches the most ridiculous but very lovable people can be made out of these brown vegetables. With the tiny, spindling feet and thin, poky arms, formed by the little toothpicks, the potato people look like humpty-dumpties, the queerer they are shaped and the more eyes they have, the more comical and amusing they are.

A parade of potatoes can be arranged by the children who are old enough to take an interest in such things. By placing the hands and feet at different angles, and choosing different sized potatoes, a procession of the most varied and interested types of people can be formed which will afford no end of fun to the children.

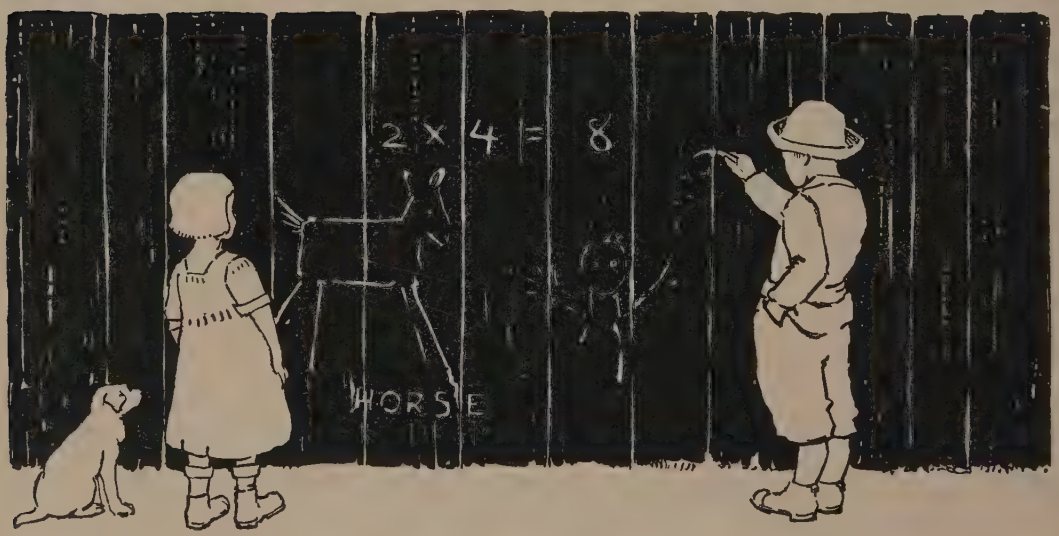
Still further amusement will be gotten from making faces for these potato people. Little bits of matches stuck at the proper places in the brown face, will form eyes and teeth and transform the humpty-dumpty to a Jack-o'-lantern with a grinning mouth or a moon face or a likeness of any of the funny pictures in the papers.

If Mother can trust the children with a knife,

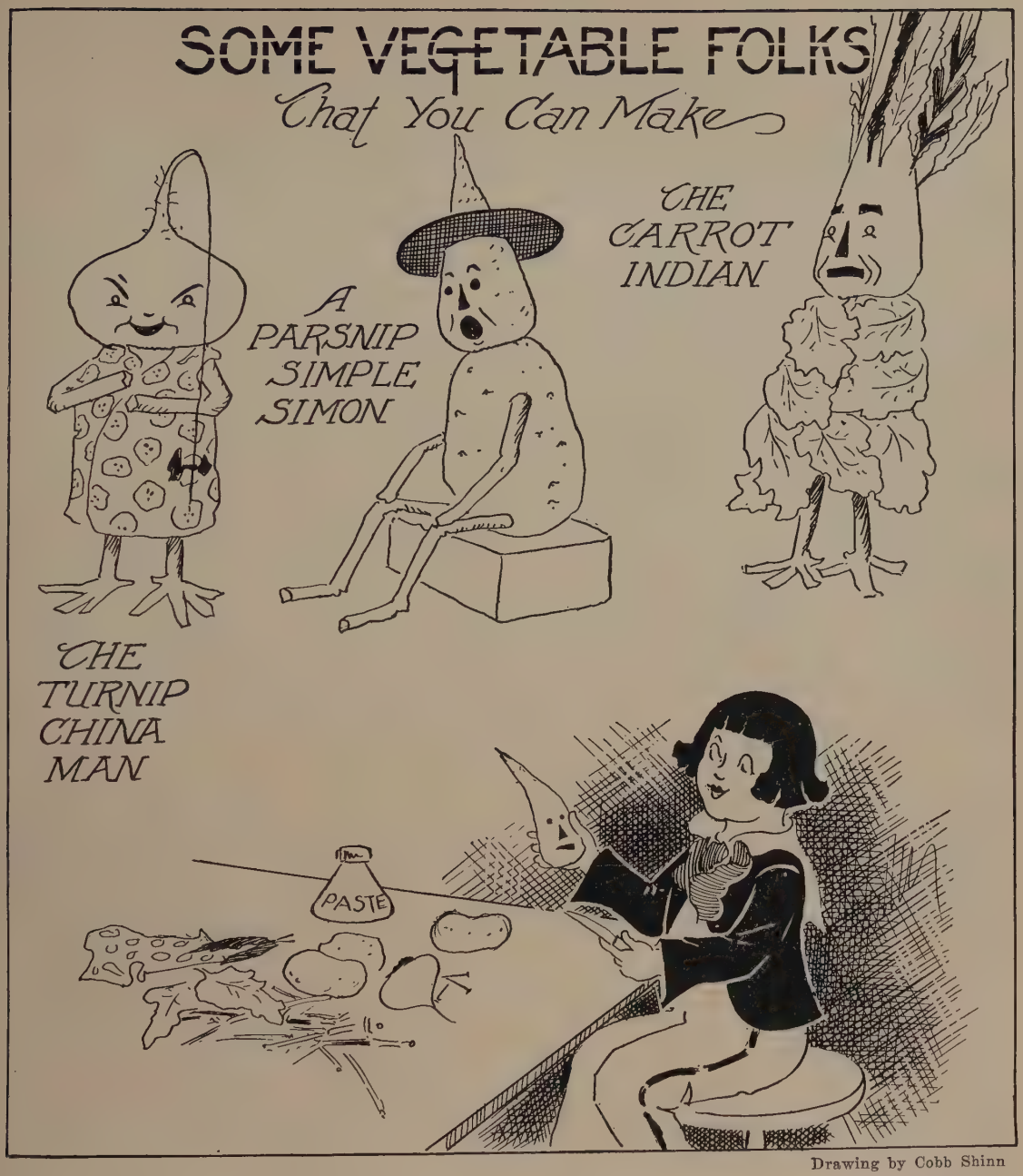
they can make another game by peeling off the skin on top of the potato's head, making him a blond or bald-headed humpty-dumpty. They can also carve out a neck and a waistline and make a very shapely little creature. The peelings, too, afford entertainment to the children who can write if they cut them off in the shape of letters or figures. Indeed, the little potato is a source of endless fun and entertainment, when one gets to know him well.



THE BLACKBOARD FENCE



As soon as the children are old enough to go to school or have older sisters and brothers in school, playing "teacher" is a favorite game. A blackboard is almost essential and unless Mother provides some alternative she may find the front sidewalk or the smooth plastered walls of the bedrooms marked up with arithmetic and spelling lessons. If there is a board-fence in the backyard, the day is saved, for the older boys can paint this black with a bucket of paint, and the children can be provided with chalk for their "blackboard work." With the children absorbed in their blackboard, sufficiently removed as it is from the house, yet within easy range of Mother's watchful eye, she is free to go on with her baking or ironing, untroubled by the plaintive whines of the little boy or girl who "doesn't know what to do."



Drawing by Cobb Shinn

A turnip makes a dandy head for a Chinaman. Carve out the eyes, nose and mouth, then fasten a black thread onto the turnip root for his queue. Use a potato for the body, and twigs make the best arms and legs. One of Dad's old silk ties makes a good kimono. Simple Simon is made about the same way, only cut out a cardboard circle for a hat. You will need a few feathers for the Indian; also some bright red leaves to make his blanket, which you can pin onto his potato body with toothpicks.

CORK-AND-GLUE DOLLS

Long corks, short corks, fat corks, tiny corks, all should be kept for the kiddies to make cork-and-glue dolls. The short fat ones make the heads,

PATRICK AND BRIDGET FROM CORK

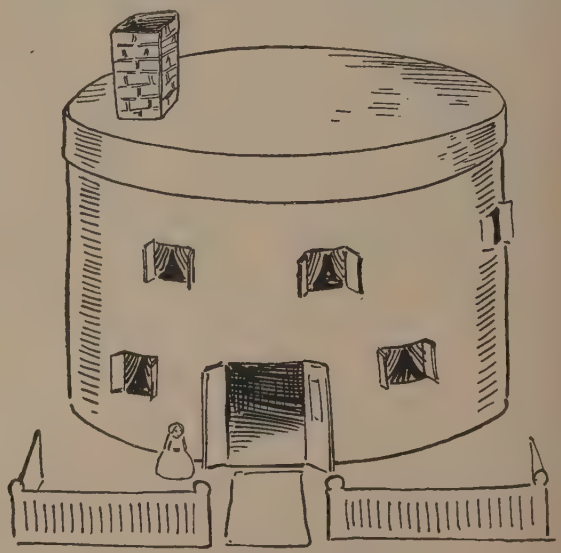
the long thin ones make the arms and legs, and the larger ones form the bodies of the doll. Glue is used to keep the various parts of the doll's anatomy together. Once the form is finished, the fun begins, because after all the most interesting part of doll play is dressing the doll. The scraps in Mother's sewing basket or crêpe paper will probably be called into service for the wardrobe, and if the little girl does not like a cork face on her doll, she will utilize one of the white scraps of cloth for a face, instead of penciling features on the cork. The square of white is tied over the head, and the eyes, nose, and mouth marked in with ink.

If the cork is used, some amusing little figures can be made. A high hat can be made of a long cork inked and tied with a red ribbon, the rim being made of paste-board, and a funny cravat can be made of a narrow white piece of white cloth tied round with a red or green string. Trousers are easily made by cutting a few inches in the middle of a doubled piece of cloth and then sewing up the open edges. A swallow-tailed coat can be made of another bright-colored cloth, and a cigar, consisting of a piece of a match inserted in the cork mouth. The results invariably serve to amuse the kiddy for hours, as the "funny doll" seldom fails to please.

THE BANDBOX HOUSE

To the child who likes doll fittings few toys give quite as much pleasure as the doll house. If he does not own a ready-made one, he wants to make one himself, and this is easily accomplished by making use of old bandboxes found about the house.

Windows are cut in the box—the exterior being all we are concerned with,—and usually the kiddy wants "upstairs and down," so two rows of windows are cut out. Yellow or red tissue paper is used to paste over the windows on the inside or tiny curtains made of white cheesecloth are pasted on the windows, parted in the middle, and drawn back with a piece of cord. A door is made downstairs and long portières of cheesecloth can be made, or instead of cutting out the entire door, a slit can be made across the top and down the middle, doorknobs of shoe buttons or paper tacks stuck in, and double doors evolved. The same thing can be done with all of the windows, the pasteboard being pushed back on the outside to give the effect of shutters. The lid of the box makes the roof of the house, and here a hole can be made and a chimney of cardboard folded to make a long square tube inserted. Red crayon will outline bricks on the chimney. A walk can be laid out with strips of cardboard leading up to the door, and a cardboard fence may encircle

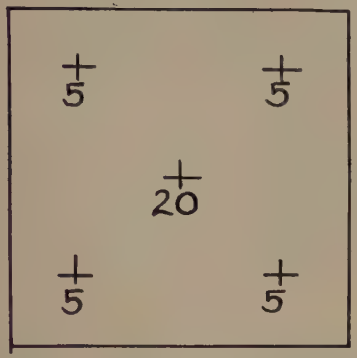


A BANDBOX HOUSE

the "yard." Here, in the Bandbox House, the littlest doll will probably be found "at home."

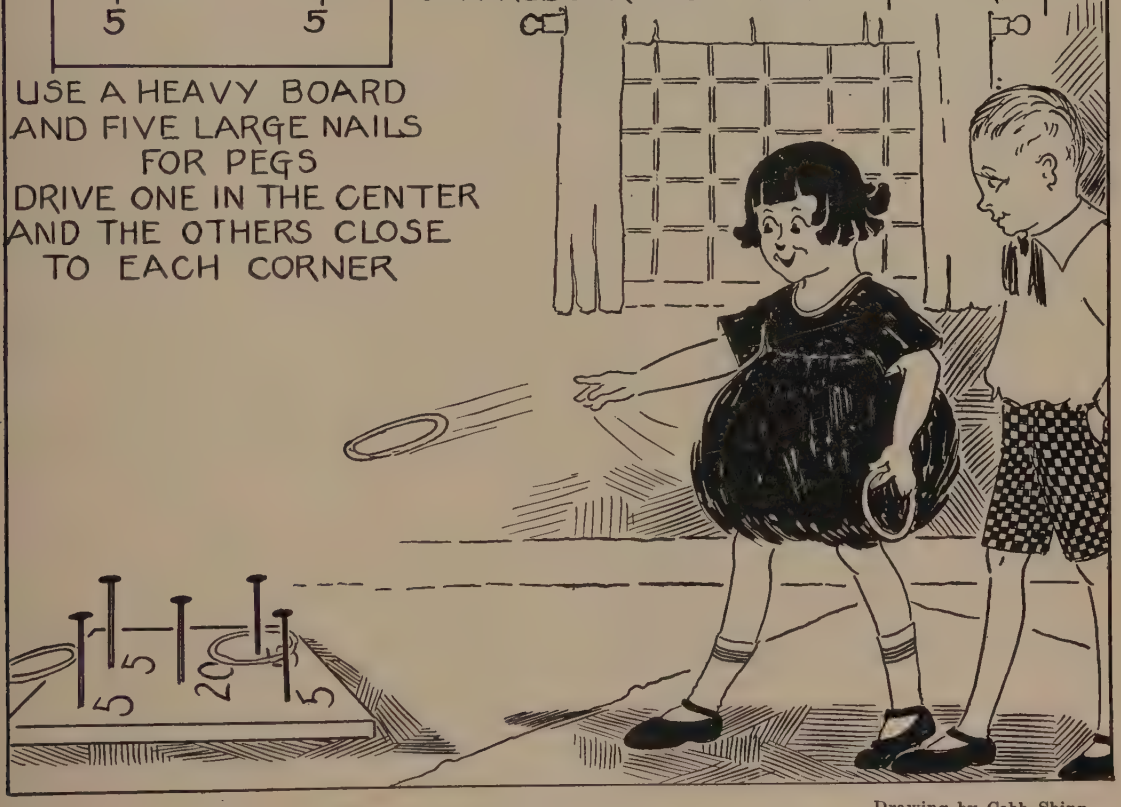
RING-A-PEG

A Home-Made Game that will not cost you a cent to make



USE A HEAVY BOARD AND FIVE LARGE NAILS FOR PEGS DRIVE ONE IN THE CENTER AND THE OTHERS CLOSE TO EACH CORNER

CUT GREEN SLENDER TWIGS ABOUT EIGHT INCHES LONG AND BEND THEM INTO RINGS
CAN RUBBERS ALSO MAKE GOOD RINGS

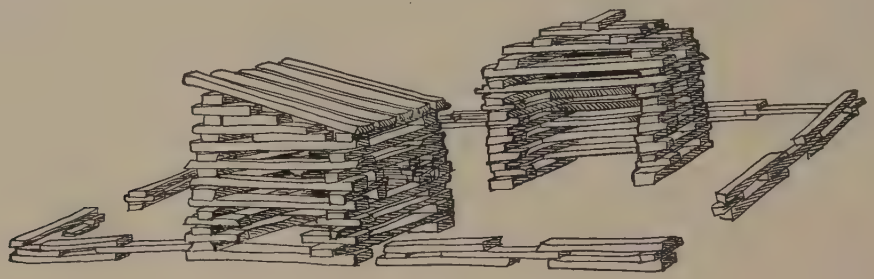


Drawing by Cobb Shinn

When you have the board and rings completed, one player tosses the rings and counts his points. Then the next player takes all the rings and tries his luck. The first player who gets a hundred, or fifty, wins the game.

BUILDING WITH KINDLING WOOD

JOHNNY will find that staying indoors and "keeping out of mischief" isn't half bad if Mother explains to him that the pile of kindling wood in the wood box may be an embryo garage, house, or barn.



A KINDLING WOOD HOMESTEAD

Spreading some newspapers over the floor in order that the wood will not make unneccessary confusion, the child begins laying out his house. There can be a wide front room with a small wing in the rear made of the shorter sticks. These are built log-cabin fashion until one reaches the caves when the sticks are laid straight across the edifice to form a roof. A fence can be built around the house, and the barn, higher and larger, built a foot or so away from the house. Sometimes Johnny will want to make two stories on his house and this is easily done by using the roof as a foundation. A small flag can be stuck on the roof of the house, and if a sloping roof is desired, three sides can be built up on the "second floor" and sticks then laid from the open end up to the back. Better still, the sticks of one size can be lined up horizontally along one wall extending a few inches above the walls, and then cardboard used as a roof, sloping from the horizontal row to the log-cabin walls. The triangular shaped openings which this leaves at each side can be partly filled with kindling wood arranged horizontally in "steps" to suit the lines of the roof, leaving apertures for windows.

PAPER CHASE

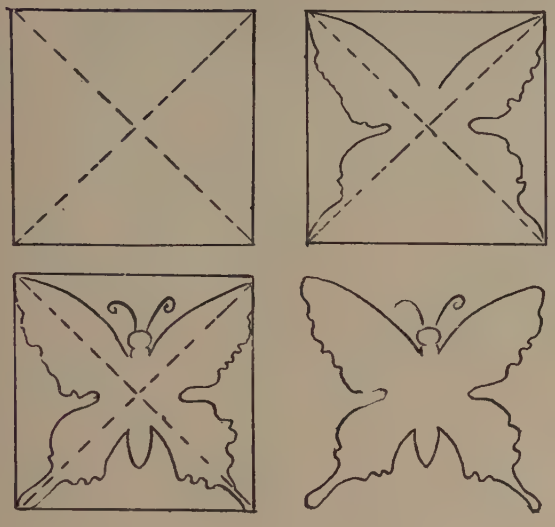
THE paper chase is usually associated with long, cross-country runs when the bigger boys and girls go off on a Saturday or a holiday for a two-hour chase. But paper chases can be adapted to the smaller children as well and may be played within even such narrow confines as the house if the day is too rainy to permit them going out of doors.

To make an indoor hare-and-hounds game, the pieces of paper that make the trail should be small—about two inches square is good. The hares start off first while the hounds close their eyes until five minutes head-start has been given their opponents. The hares then wind around in and out the rooms, all over the house, if Mother will permit, dropping their bits of paper as they go, behind the chairs, under the sofa, between the table legs, anywhere that will make a difficult trail to follow.

The hounds start in at the end of the five minutes and they must not only follow the trail that has been made but must pick up all the pieces of paper dropped by the hares. This will, of course, take longer than just discovering the track of their opponents and it very often happens that the hares reach home before the hounds have caught up with them. It is then their turn to be hares again, and these they will continue to be until the hounds have overtaken them on the chase.

While the smaller children can play the game very well in the house, it is much more interesting if they have the whole yard or even two or three neighboring yards in which to hold their chase. The one point that Mother must always insist on in teaching the children this game, is that the hounds must be sure to pick up the trail of papers left by the hares. If any scraps are left on the floor after the hounds catch up, the victory does not count for them, but for the hares.

Butterflies that Fly



Drawing by Cobb Shinn

After you have your butterfly cut out and pasted on the cork and placed in the end of a spool, place the spool to your mouth and blow sharply, the butterfly will ascend rapidly to the ceiling and float slowly down.

BURDOCK BURR TOYS

Burdock burrs are like the little girl with the curl in the middle of her forehead, "when they are good they are very, very good, but when they are bad——" But Mother wants to know about their being very, very good, for she has had enough experience of their horridness when little Daughter's curls get caught in them or young Son tumbles into them with his woolly sweater on. And nothing could be nicer than burdock burrs when it comes to making toys. Even the tiniest children can make baskets, tables, chairs, balls, crosses, dishes, and all sorts of simple articles by ticking these soft fuzzy burrs together.

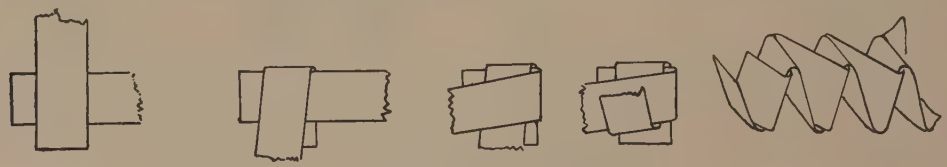
BURDOCK BURR TOYS

The older children can make figures of men and women, dolls, lamp shades, and any number of more complicated shapes by a very careful molding of these pretty burrs. It will not only provide very interesting entertainment for them, but will be a splendid training in inventiveness and careful handiwork. Mother will find that once the children become interested they will become very eager to make new and different sorts of toys, each trying to outdo the other in the number he can construct.

PAPER CHAINS

One of the easiest ways for the kiddies to amuse themselves in the house is in making paper chains. This is one of the first things taught in kindergarten work and requires very little in the way of equipment—simply large squares of different-colored paper. The paper is first cut into strips about an inch wide and as long as the size of the paper permits. In making ring chains, these strips are in turn cut into two-inch pieces, the ends being pasted together to form a hollow paper ring, after being drawn through the preceding ring. Chains of all lengths are made, the different colors being used to give a rainbow effect. For children's parties these paper chains make an attractive decoration, and can be hung from the chandelier, and around the walls of the dining-room where the party is being held. The strips can vary in length and width according to the size of chain link that is desired.

THE RING CHAIN

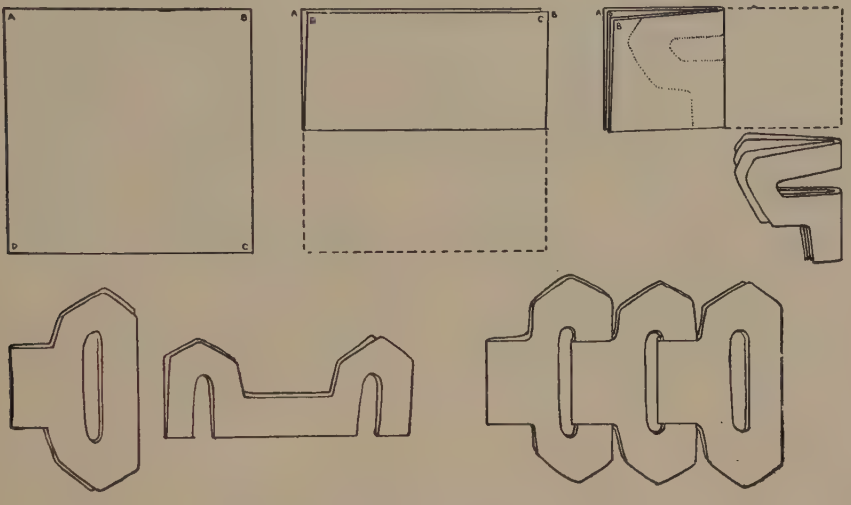


THE FOLDED CHAIN

Another way of making paper chains is by folding two long colored strips. The two strips are placed at right angles to each other, the one

overlapping the other and folded over or pasted to make it secure, for beginning the chain. Then the bottom strip is folded over the top strip, making a neat square; the other strip is folded over again, and so on until a long chain is completed.

Chains may also be made without scissors or paste. Each link is made from a square of paper. First fold the square into quarters; holding the four loose corners in the left hand tear out a shape like a figure five upside down. Unfold



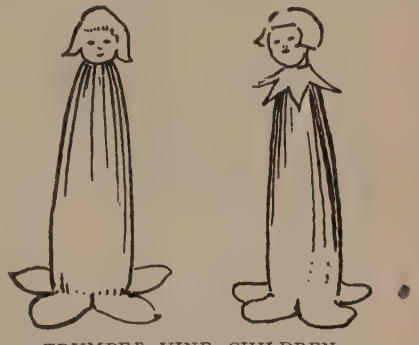
A CHAIN WITHOUT PASTE OR SCISSORS

To make it a long chain, paste new strips to the old, end to end, as fast as one is used up. One strip of blue or purple and the other of yellow, and similar color combinations, make pretty chains that will delight the child. Here is a good opportunity to teach a lesson in color-harmony.

once, and the first link is ready. Make a second link like the first; unfold this entirely and then fold in half the other way. Now slip the second link through the opening in the first, open out, and fold over like the first link. The third and succeeding links are treated like the second.

TRUMPET VINE DOLLS

The trumpet vine that clambers over the kitchen porch has more uses than simply that of making the porch beautiful in summer, for the long slim blossoms can be made into lovely little flower dolls. Heads can be cut from fashion pages of magazines, leaving a short stub to be fastened to the neck of the flower, and a charming array of flower-garbed paper dolls will soon be on display, for the other children to admire. Perhaps the little girl wants to have her flower children dressed for the street or for Sunday meeting. Then a part of the leaf is made into a little bonnet and fastened on with a twig or firm stem. A green cloak is made of the leaf, and this too is fastened about the neck with a twig. Sometimes dandelion faces can be used on the trumpet blossom, with the stems thrust in the flower for arms. A boa of three-leaf clovers can be linked together and draped around the shoulders, and sometimes a fringed cape of blades of grass all fastened to one longer blade which is loosely tied around the shoulders of the doll, makes pretty contrast to the red petals of the flower. Games with

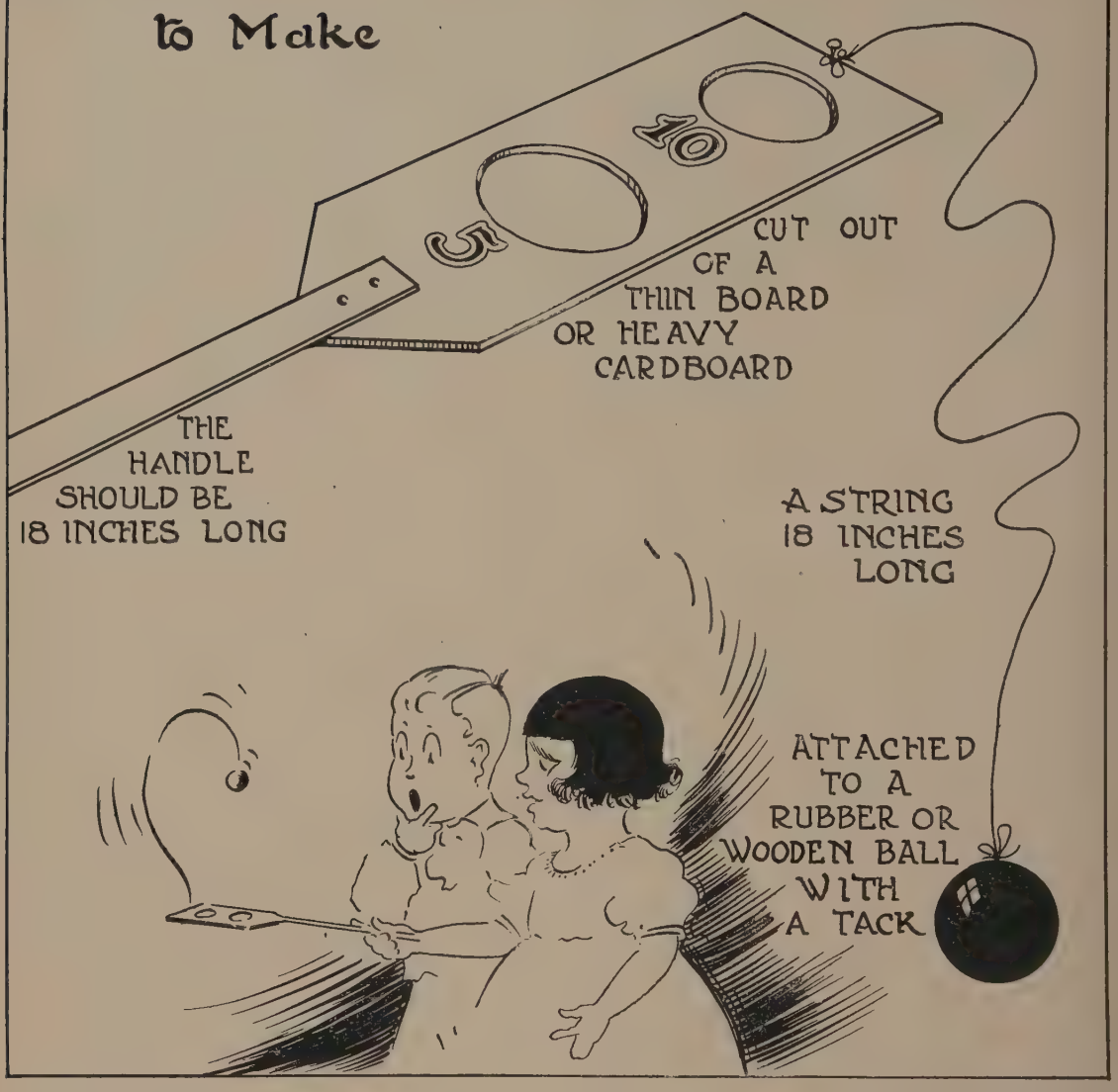


TRUMPET VINE CHILDREN

flowers heighten the child's instinctive love of beauty, although he should always be taught that things that grow are to be admired and not destroyed wantonly.

DROP-A-BALL GAME

For You to Make


5
10
CUT OUT OF A THIN BOARD OR HEAVY CARDBOARD
THE HANDLE SHOULD BE 18 INCHES LONG
A STRING 18 INCHES LONG
ATTACHED TO A RUBBER OR WOODEN BALL WITH A TACK

Drawing by Cobb Shinn

The players take their turns at trying to throw the ball through the holes. The first boy or girl who gets an even 45 wins. If the number of points should happen to be 50, the player must start all over again. This makes the game more difficult to win.

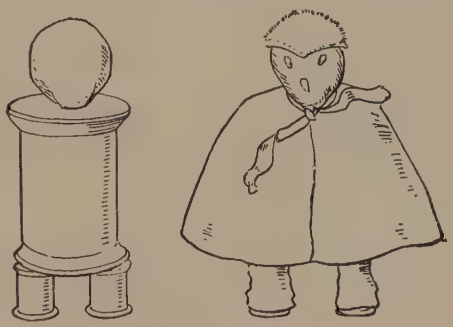
THE MAGNET

The magnet is sure to fascinate the child, for he is bound to be interested in the queer little tricks of nature and science. Picking up the small steel bar with his magnet is of course the first thing that presents itself in playing with it. Then it is fun to find what objects the magnet will attract and see at what distance the attraction will begin to be felt. When Mother is dressmaking she will find willing helpers in cleaning up the inevitable débris of pins, by asking them to see how many pins the magnet will pick up. Other ways of amusing oneself with the magnet will be found when the child has become acquainted with his new toy and discovered its possibilities.

There has been thought out by a scientist a plan for controlling boats from the shore by means of electricity. As the little boy uses his magnet to control his metal boats as they float in a tub of water, he is practicing the principle used by the scientist.

DOLLS MADE OF SPOOLS

Many and varied are the toys that can be made with empty spools combined with boxes, and other odd pieces around the house. Dolls are as easily made as anything else. A large spool is chosen and cotton stuffed in a piece of cloth used as a head, the ends of the cloth being drawn down the hole of the spool to insure the giddy young doll against losing her head. A marble can be substituted for a cotton head, the cloth being used in the same way, with features marked on with lead pencil or crayon. Arms of smaller, slender spools or matches can be glued to the wide neck of the spool body and the legs can be made in the same way, glued to the bottom of the spool. Then the scrap-basket is gotten out and odd pieces of silk and ribbon called into service for the making of a proper costume for the lady. Crêpe paper can be used as well, although for this sort of doll cloth garments seem to work out better. Black ribbon or strips of the cloth can be wound around the match or spool legs for stockings with boas of infinitesimal pieces of string. A pasteboard hat with a ruffle of crêpe paper can be made and easily stuck on the head if it is of cotton. With



A SPOOL DOLL

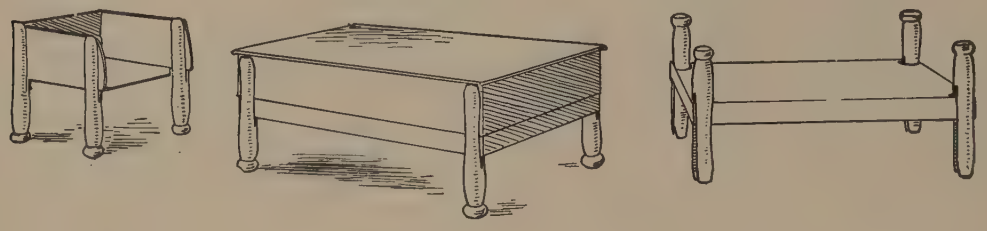
these spools the little girl finds a method of increasing her doll family that is entertaining and at the same time does not touch her small savings bank.

TOYS MADE OF CANDY BOXES AND CLOTHESPINS

The resourceful child will find that he can make something out of most anything—including candy-boxes and clothespins. Cut a pound or half pound box in half, cut slits in the four corners, fasten in four clothespins for legs, and you have a first rate doll chair, the small upright pieces serving back and arms. The table is even easier to make, for the whole box or lid is used, with the pins in for legs again. Beds are made in the same way, only the pins are inserted but half way to leave four posts above the bed.

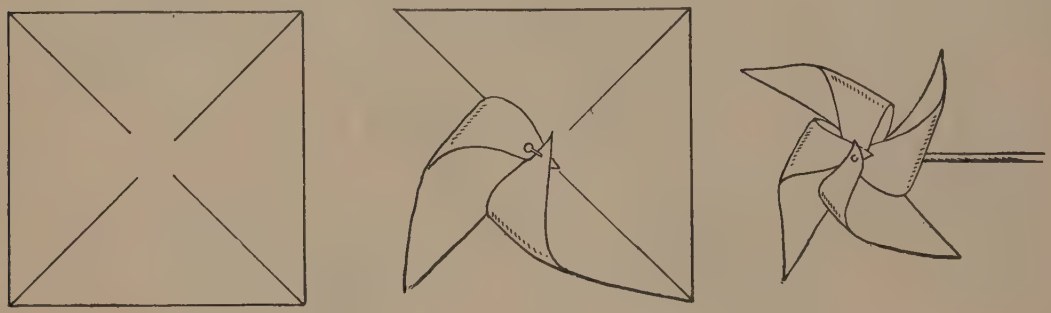
Probably the most fun of all is in using the

clothespins as railroad ties, interlocking two for each tie and placing them a clothespin's length apart along a track of pins. Then use a small candy box as a train, or even use two or three so that there will be plenty of coaches to take care of the paper doll passengers. On the engine clothespins are used for smokestack and whistle. The engine and coaches are attached to each other with a piece of string, and the whole train is drawn around the track by a string. Wagons with wheels that won't go around but at least look like wheels are made by thrusting four clothespins in the four corners on the lower edge of each box, half of the forked part of the pin being on the inside of the wagon and half on the bottom, with the tiny knobs of the pin showing on each side as the wheels. A broken pin can be stuck in the upper part, and we have an auto!



PINWHEEL BAZAAR

Any school-teacher will probably assert that pinwheels are an abomination and a perfectly useless toy, due to the fact that as soon as Tommy learns how to make them he introduces them into the schoolroom. But there is nothing to prevent the kiddies from playing with them outside the study room, for they provide a great deal of fun. A square of any size is cut from a piece of paper, —the more colors one has, the better,—and cuts are made toward the middle from the four corners of the paper. One corner of each of the four segments is folded to the center and there all four are caught with a pin to the stick. The children hold these against the wind and the wheel whirls around gayly to their great delight.



Part of the fun of pinwheels is in having bazaars. Here Tommy arranges his array of brightly colored pinwheels which he has made and sells them to the other boys and girls for ten pins or any other fixed price. Some sell for pins and others sell for colored paper or the stick, the idea being to get through the sale enough equipment for more pinwheels to start another bazaar.

Having sold out, "boss" Tommy sets to work with his helpers to making more pinwheels and thus the chain goes on endlessly until some new sport is introduced into the play time. Sometimes, as a drawing card for the bazaar, a large figure X is made of two pieces of kindling wood, the center being nailed to a tree or post. On this the paper parts of the pinwheels are stuck so that the wind makes the wooden wheel turn slowly and all of the brightly colored pinwheels whirl around with it. Nearby Tommy has his counter and the shoppers make their selection from the display wheel and are supplied from the "stock" room under the counter.

How to Build a Toy Power-Boat
A LIGHT PINE BOARD 5"X12"X1"
TWO LONG NAILS
CUT TWO PIECES 1"X5"X1/4"
FIT THEM TOGETHER TO MAKE A PROPELLER
PLACE THE PROPELLER BETWEEN TWO RUBBER BANDS
Drawing by Cobb Shinn

When you have the boat complete and the propeller placed between the rubber bands, then you twist the propeller around and wind up the rubber band. Place the boat on the water and away she goes along under her own power. Two rubber bands are better than one, for then you won't have to wind it up so often.

TRANSFORMATION SCRAP-BOOKS

Almost every mother can remember when she used to be invited to birthday parties and be entertained by comic lantern slides thrown on a big white sheet against the dining-room wall. Well,

TRANSFORMATION SCRAP BOOK

the transformation scrap-book will give the children just as much fun without all the expense and trouble of a magic lantern.

The scrap-book, which may be a fine one bought at the store or one made at home by binding loose leaves of heavy paper together, is first made up just as any ordinary scrap-book is. Pictures of men and women, of boys and girls, of animals and statues, of furniture and buildings, of streets and railroad trains, are carefully pasted in. When the book is filled, Mother or one of the older children takes the scissors and cuts each page across from left to right in three parts, which may be equal or not, as long as each section is the same throughout the book.

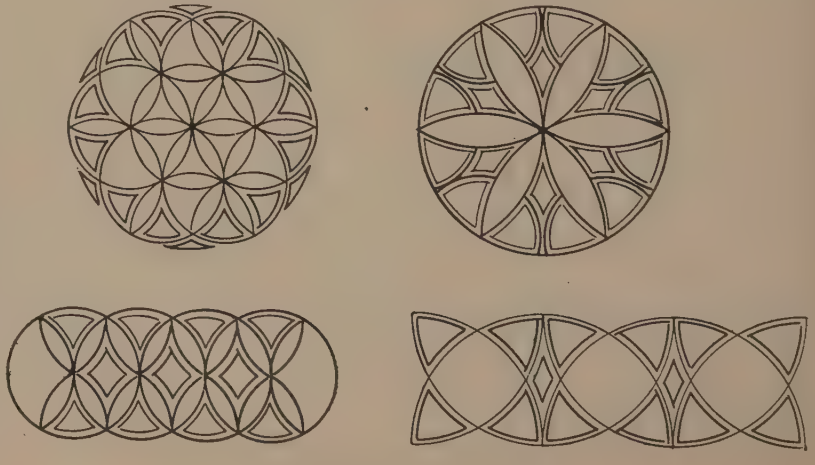
Now the fun begins. Using the top of one page, the middle of a second page, and the bottom of a third page, some of the most ridiculous pictures are made. The children will go into shrieks of laughter to see a bearded gentleman with a tall silk hat, for instance, placed on the body of a very thin lady with a shawl who walks on the feet of a little boy wearing socks. With just this as a suggestion, it can easily be seen that any number of extremely funny combinations can be made. Page four at the top may be a pretty young lady who, by turning to page five for the middle part of the picture, appears to be dressed in a sweater and holding a football in her hand, while page six has her garbed in rubber boots wading through a brook.

For the transformation scrap-books, figures of people or animals are much the best, as other pictures are not apt to give so funny an effect when changed about. But whatever is chosen, it is sure to amuse the children who never tire of laughing at the funny pictures they create.

COMPASS (DIVIDERS)

For the children who are big enough to handle a compass without jabbing the sharp point into their fingers, the compass is a very entertaining as well as very instructive plaything. With a few large sheets of paper,—wrapping paper will do, if there is not a large supply of scratch paper in the house—the children can make any number of different figures and at the same time learn a great deal about drawing. Placing the sharp end of the compass firmly on the paper and turning the other penciled end about it as a pivot, circles of all sizes may be made by turning the little screw at the top of the compass which makes the two arms separate at any angle desired.

The children may cut out the circles if they



FUN WITH THE COMPASS

like, or they may make drawings of them by putting in spokes, as if they were wheels interlooping different circles, until they have a chain, or sketching in moon faces or human faces if they are old enough or have a talent for drawing. This game will, of course, appeal more to the studious or quiet child than to those who are more active and vigorous, but it is a particularly good pastime for a rainy day and when measles come a-visiting.

MAKING COSTUMES

"All the world's a stage," said Shakespeare, and it is surely true that from the time children are old enough to talk they want to dress up and pretend that they're some famous heroine or hero or some very much loved person they know. This is their way of having dramatics.

A few very simple materials will be enough to make very interesting costumes if the children are patient enough and imaginative enough to put them together. With the poker for a sword, and a red sash made from Mother's cast-off wardrobe or an old curtain or something of the sort and a cocked hat with a feather—the hat of paper or a discarded one of Father's with a chicken feather stuck through it—and we have a young prince as dashing as any in the fairy books. A portière, an old cloak of Mother's, an improvised crown of colored paper pasted on cardboard, or flowers, and we have the fairy princess.

If Mother has any colored crêpe paper, most elaborate costumes may be made by pinning or pasting strips of red and blue and green in the shape of skirts or little cloaks and caps. Fairies, with short dresses of green; Little Red Riding Hoods, with a long red cloak; Little Boy Blues with a blue coat—a strip for the back, one for the front, pinned together under the arms, and a long, narrow strip pinned or pasted on the inner seam of the arm make a very passable jacket—and blue trousers made like the sleeves of the coat,—all the characters of the favorite stories may be represented with these paper costumes.

If Mother is too busy to suggest costumes herself, pictures in books, especially those in the volumes of this set, will furnish excellent models which the children will be very quick in imitating. The more they are left to their own initiative, the more amusement they will get out of it. Some of the results turned out by childish fingers will show marvelous ingenuity.

PUSSY WILLOWS

Pussy-willow-time is the signal for all the kiddies to bring home armfuls of the furry-budded stalks for Mother to put in tall vases about the house. The little buds lend themselves easily, also, to Easter card making. Mother provides the children with colored cardboard or a heavy quality of drawing paper on which they can put their own colors with crayon. Sometimes they like to make simple little pictures of trees, a house, or an easy design of that sort, and then color it with their

crayons. A tiny twig with a cluster of pussy willows on it is then drawn through diagonally. A brook is easily drawn on the card with ripples of

blue crayon, and along the bank a whole row of the pussy willow stems can be stuck in, pin-fashion, to give a realistic effect.

Squirrels and bunnies, too, can be traced on the cardboard from the child's drawing book, and if the supply of pussy willows is plentiful, the body can be massed in with the buds, the eyes being dotted in with red or blue crayon. The twigs are stuck in with pins or paste, first along the outlines and then in the middle, the general effect being a gray, fuzzy little animal that is sure to demand quite as much petting as a live one. If there are only a few of the buds, the outline alone can be done in the pussy willows, with the ears and tails filled in.

The pussies can be pasted to a card and heads and tails added with crayons; these will be very real-looking pussies, especially if a fence is drawn first and the willow pasted on the top rail.

Tiddledywinks can be played with the buds that drop off, using a tumbler as the pit. The fingers are used to snap the pussies into the glass, the child endeavoring to get all of his buds into the goal.

PAPER MONEY

A PENNY and a nickel will serve as models for the kiddie's paper "mint." He places a piece of paper over the coin and goes over it not too heavily with a lead pencil until the figures on the coin become visible on the paper. It is best to use the side of the coin on which the denomination is engraved, for convenience in making purchases with the paper money, at the playroom store. The paper is then cut out and pasted on a piece of cardboard of the same size in order to make the counterfeit currency serve its purpose a little longer. Usually each child wants a large supply of the paper money, and once the money is divided, playing store is in order. One child gets all his belongings together behind a counter, improvised from a doll table or from a washbench, and all take turns being storekeeper and shopper. Sometimes the paper idea is carried out even into the store supplies. Cans of soup, bread, pies, crackers, and indeed all sorts of food are illustrated in the magazines and these can be cut out for the shelves of the grocery store to be sold to a prospective customer. If several children are playing the game, there may be two or three other shops besides the grocery store. Automobiles can be cut out of the magazines for the young auto dealer to exchange for a large supply of paper money. Someone else may have a clothing store where ladies' dresses, cut from the fashion plates and headless unless otherwise desired, are on sale.

The advertising pages of the magazines will give the kiddies many ideas for stores where they may play shopkeeper, and dispose of their pocketfuls of homemade coin.

Besides affording much amusement, the game has its commercial value in teaching the kiddies values in business.

CREATING A PICTURE

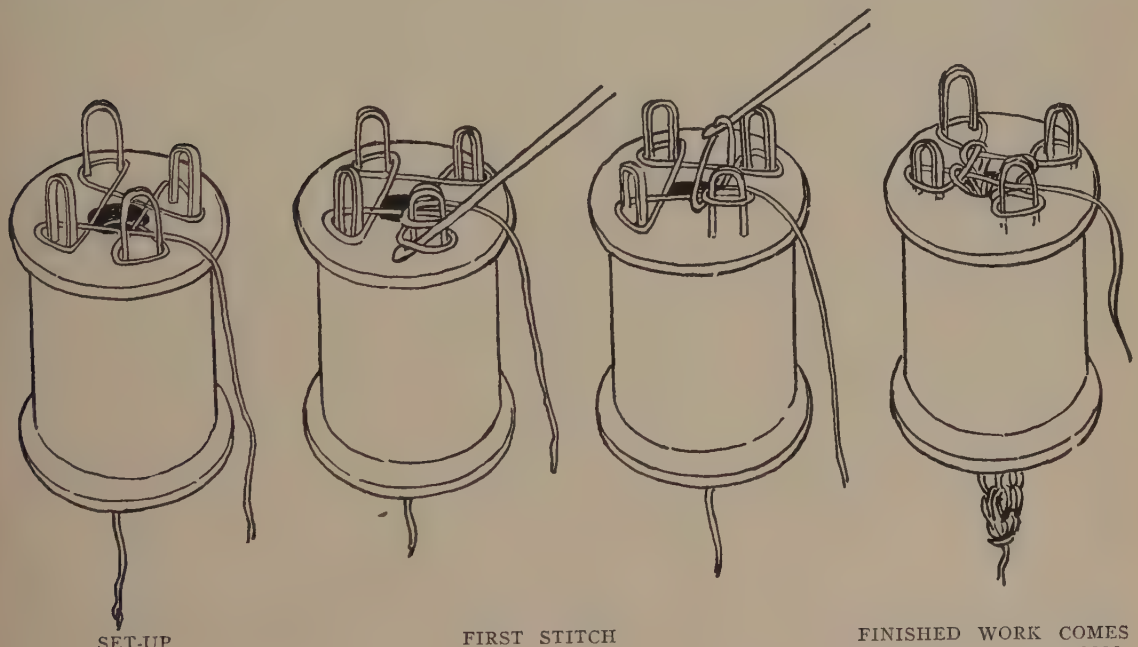
"CUTTING-OUT" is a favorite pastime of children, and Mother can be assured of getting her own work safely finished if she provides the kiddies with a pile of old magazines and a pair of scissors. Two or three sheets of cardboard are helpful in the game of creating pictures, bringing out the general design sharper as well as keeping the bits of clippings off the carpet. Mother explains to the child that he—or she—is to cut out a number of objects and then collect them

into one picture on the cardboard, either pasting them on for the scrap-book, or simply laying them on and changing them according to fancy. For instance, a figure is cut from the fashion sheet, and placed by the side of a rocking-chair picture, cut from the advertising section. A picture of a victrola is placed nearby, a lamp on the table, a davenport a little in the background, a picture "hung" here, the print of a doorway with curtains at one side, and thus the child has created a picture of a living-room. He can have as many figures as he likes, a man from the overcoat ad., a child from the soap ad., and so on.

Outdoor scenes are as easily managed, for there are always trees, flowers, church-buildings, and residences illustrated in the magazine pages, either in the advertisements or in the fiction department. The thing is to select and arrange these so that they will appear in proportion when placed on the cardboard. A figure, clad in outdoor garments, a dog, or an automobile can then be put into the picture, as the child usually likes to have some evidences of life about the final result. The clippings can be put away in a scrap-book when the child wearies of the game, to be arranged in some other fashion next time.

SPOOL KNITTING

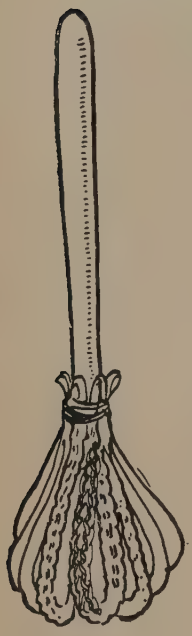
Spool knitting is a pastime as old as our grandmothers and great grandmothers, and will probably continue to amuse children for centuries to come. All that is required is nimble fingers, concentration, a spool, a ball of string, and a few double-headed tacks. An empty spool with a large hole is chosen and on one end of this four—or as many as are desired—double-headed tacks are fastened at equal distances from each other. The end of the string is drawn through the hole extending an inch or so below the spool. It is down this tail-piece that the knitted rope comes as the work progresses. The string is crossed around the tacks, once, and the loose part which comes from the ball is laid on the outer edge of the spool, behind the tack. It is drawn through the loop already on the tack, taking its place and permitting the first loop to slide off toward the center of the spool. A crochet hook, hairpin, or piece of wire is used to lift the stitch over the tack, and the work continued until the cable-like knitted piece resulting is as long as is necessary for the object in mind.



SET-UP FIRST STITCH FINISHED WORK COMES OUT AT THE BOTTOM

One of the easiest things to be made from

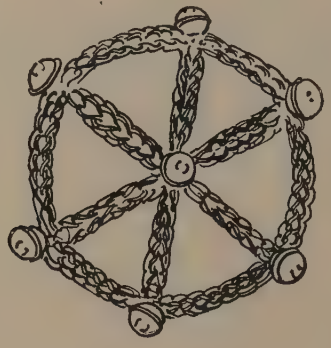
spool knitting is horse reins. This requires a strip of knitting about three yards long, a piece about a foot long being left as a harness, connecting the two reins. The child slips his head in the noose-like harness with the reins hanging free and the playmate who is the driver begins the signals for "geeing" and "hawing." Odds and ends of wool from Mother's knitting are the best materials for the reins.



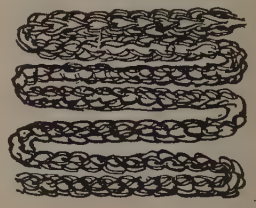
DISH MOP

A dish mop can be made with three or four yards of the knitting and a small, round stick. The string is looped up into loops about five and a half inches long, and the ends of these are tied around a notch in the end of the stick. The kiddy not only feels that he is making something that will help Mother when it is finished, but he is learning that play can often have useful results. Soft, white crochet cotton is just the material to use.

A jumping rope can be made from the spool knitting, also, doubling over the ends to make convenient catches for the hands. This requires a larger spool and the string which has been saved from bundles.



BABY'S RATTLE



MAKING A DOLL'S MAT

Another object easily made is a rug for dolly, the knitting strips being sewn together into a mat whatever size the earnest little worker wishes. Or a ball can be made for Baby by winding the pieces around each other mat-fashion up to a certain diameter, then decreasing the circles and securing the whole with the end of the piece. A rattle that the baby fingers can easily clutch is made by forming a small circle of the knitting and then sewing on crosspieces, with a little bell or rattle at each point where the crosspiece meets the outside piece. Many other toys and household articles can be manufactured from the knitting if Mother will outline them or if the child will think up plans for himself or herself.

SPOOL BUILDING

Spools are a source of unending delight to children. They are not meant to be played with, and they know it. It is human nature to always want to do something we are not supposed to do. Blocks are manufactured for the purpose of play; spools are made to hold thread. When there is a child in the house, no spools should ever be thrown away. The wee baby who cannot sit up will delight in playing with a string of spools hung in front and above him, but close enough for him to reach. They may be left white, or they may be colored with waterproof paint.

Somewhat later, when the little fellow begins to toddle, he will like several of these tied so that he can drag them after him as he would a cart.

But greater fun with spools comes when he is still older. It is building. The first attempts will be very simple, probably just one spool put on top of another. As time passes, more difficult projects will be attempted.

One of the chief advantages of spools is that they are sanitary; having no pictures on them or paint that can be washed off, they can be washed and scrubbed to the content of the most aggressive germ-hunting mother.

PAPER DOLL HOUSE

FURNISHING a paper doll house is quite as exciting to the children as furnishing a real house is to the grown-ups. And it is far more fun, for the children do not have to think of the expense at all. A dozen or so newspapers, a magazine or two and a pair of scissors and some paste, and the children have all the materials necessary for making the most beautiful house.

Every paper and magazine has a large number of pictures of all kinds of furniture in its advertising section and in the illustrations of stories and articles. First, the children take the hall. They pick out a pretty mirror, a rug or two, a hatrack, perhaps, a clock, and if they are particularly inventive they may even cut out umbrellas and whisk brooms and various other articles that may be found in the hall.

Then there is the dining-room. Tables, chairs, china closets, buffets, sideboards, dishes, silver, glassware—there are a host of interesting things to fill a dining-room. And on they go from room to room. The sitting-room will keep them busy for a long while. Everything from the big center table, to Mother's sewing basket and Father's pipe may be put in here. The bedrooms and nurseries will also be great fun.

As the furnishings for each room are found, they are cut out and pasted in the proper places on a big sheet of white paper or stiff piece of cardboard. Then the sheets are placed together in the proper positions until the children have an entire house for their paper dolls to live in.

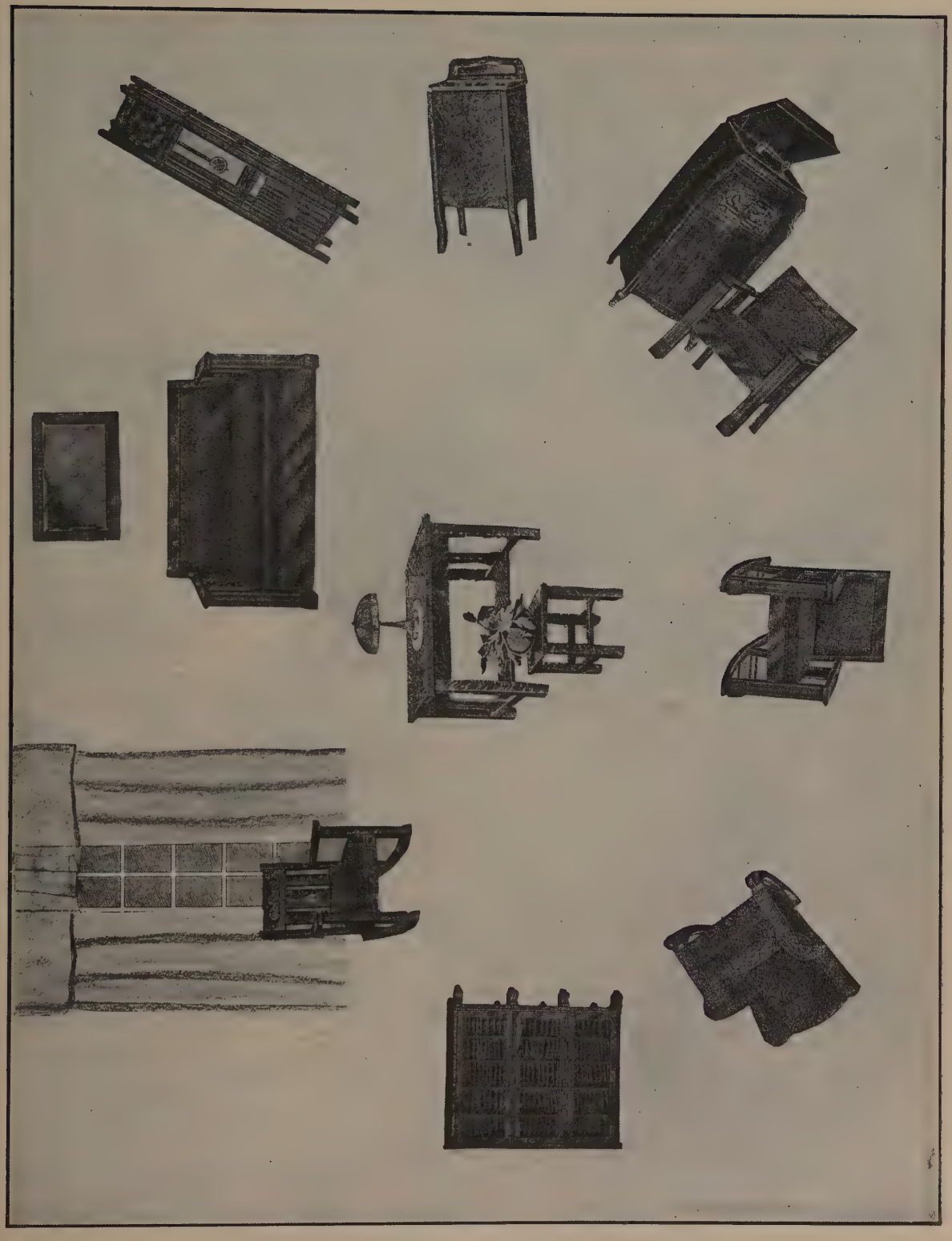
For the smaller children who have not the ingenuity to pick out furniture, very attractive houses may be made by cutting out pictures of rooms, already furnished and placing them side by side to form a house. For the girls especially, who will have most of the task of furnishing and arranging their future homes, this game will be most helpful.

SKIRTS MADE OF LONG GRASSES

DRESSING-UP doesn't have to be up in Grandma's attic in order to be great fun for the kiddies, for they can get almost as much enjoyment in dressing themselves up in grasses. Long blue grass is tough and lends itself to considerable tying and untying without tearing. The kiddies use a heavy vine—grapevine or long grasses braided together to give sufficient strength, as a belt and on this the blades of long grass are tied, fringe fashion, to make the skirt. Sometimes shawls are made in the same manner. The costume is great sport when the little boys are playing Indian, or savage, and in impromptu outdoor theatricals when dressing-up is in order but the attic is not accessible for the regular dress-up costumes. Children, moreover, are always happiest when they have invented their toy or game themselves, and in making the grass costumes they have this creative desire satisfied. Plaited wigs of grass can be made for the boys and then "scalped" by some ferocious playmate who happens at that moment to be an Indian, or the braids can be used as cues when the backyard is China. Other games and ways of using the grass will suggest themselves from time to time to the children.

PEANUT HUNT

HUNTING for buried treasure has always been one of the most fascinating things in the world and as soon as the children are big enough to read they want to imitate Captain Kidd and the other adventurers who went out in search of hidden gold and silver. A peanut hunt has very much the same idea and arouses the same excitement and interest. For entertaining a party or



THE LIVING-ROOM OF A PAPER-DOLL HOUSE

even three or four children there is no more captivating game.

The children first gather in one spot, which shall be a sort of home base, and draw lots for who shall first be "it" and hide the peanuts. This done, they cover their eyes for five minutes, or whatever time shall be decided on, while the contents of a bag of peanuts are hidden all over the room and over as many rooms as Mother will let the children play in. Behind the clock, under the sofa pillows, in corners, back of pictures on the mantelpiece, in vases, everywhere where they will not be too conspicuous the peanuts are put.

When the five minutes are up, the children start hunting. Ten or fifteen minutes is allowed for the peanuts to be found. The boy or girl who has discovered the greatest number is, of course, the winner and has the privilege of being "it" the next time.

FLOWER CHAINS

Just so soon as the first daisies have appeared in the fields, the fun of making flower chains begins. Mother has only to give a very short lesson, and the children will be expert chain makers, vying with each other to see who can form the prettiest and the longest chains.

The chains may either be little short ones—just long enough for a bracelet or a necklace or a crown—which each child will make by himself; or they may be quite long ones, long enough to jump rope with or to make a sash of or to twine about the porch railing. These long ones the children will make together and a great deal of fun they have, sitting in a circle working with their pretty flowers.

If chains of any length are to be made, it is better to have the children take turns picking the flowers. Of course, they will all start in together, but as soon as each has collected an armful, it is a good plan to have half of them begin on the chains while the other half go on picking and bringing in fresh flowers. In this way, no one will get tired of the game and the flowers will also be fresher to work with.

The making of daisy chains is very simple. The flowers are wound around each other with the heads near enough together to make a solid rope of flowers, with only a little of the stem showing. If the children are working together and want a very thick chain, the heads should be bunched quite closely, but if only a necklace or bracelet is to be made, a single arrangement of the blossoms is quite sufficient.

The clover chains are, perhaps, the prettiest of all. They not only have a charming color combination, but a sweet fragrance which makes them particularly suitable for necklaces and wreaths and bracelets. They are made in the same way as the daisy chain though they are never so thick or long, because the blossoms are smaller and the stems shorter and more slender. By twining together several chains, caps and scarfs may be formed and little coverlets for the doll's bed, or blankets for the toy horses.

The dandelion chains are constructed just as the clover. A very beautiful effect may be gotten by combining these two flowers, the gold of the dandelion blending most charmingly with the purple and white of the clover.

While grass chains are not so beautiful in color as the others they are perhaps the most fun to make. These are made by braiding long grasses together. A number of blades are taken for each strand so that the chain will not be too stringy and thin. Care must be taken to join the new strand to the chain before the last is finished or else the chain will pull apart. Grass which has seeded and looks like wheat makes most attractive chains. The fuzzy heads are left standing above the braid.

In making the grass chains, the children may wish to form real links. In this case, pieces of about six inches long are made, looped together and bound at each end. Links may also be made in the daisy, clover, and dandelion chains, but it is usually more bother than the children wish to take.

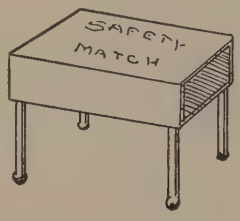
Drawing by Cobb Shinn

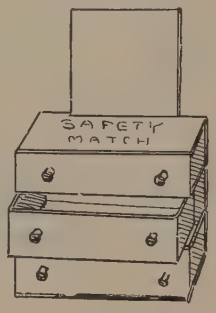
Do you know what a boomerang is? It is a two-sided piece of wood, used by the Australians in their sports. They can sail it through the air and it will go a certain distance, then curve around and come back to where it started. You can make one out of cardboard, using this one in the picture for a pattern. To sail it, place it flat on the back of the left hand, sloping your hand upward. Then flick the boomerang smartly with the first finger of the right hand. It will fly away, make a graceful curve through the air, and return to you.

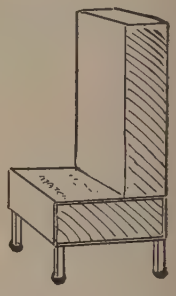
MAKING FURNITURE OUT OF MATCH BOXES

"Safety First" is the rule in playing with matches or match boxes. And, fortunately, it is the little safety match boxes that make the best furniture. Almost anything can be made out of these little articles with the aid of a pair of scissors, the matches inside of them, and a little glue, if only the children will try.

First, and most simple of all, is the table. Using the matches as legs and sticking them in the four corners of either the lid or the drawer, even the tiniest child can make a table that will look just as good as any in the furniture store when placed in the doll's house. If the boy or girl is inclined, he may make a round table by tracing a circle with a coin or a salt cellar on the inside of the box and cutting the table top from it.







Chairs to go with the table may be made by placing the drawers back-side foremost, on end to form the back of the chair and the back legs. The cover is then cut in half to make the right-sized seat and its edges taken off. Two matches, cut about half the length of the match box, make the front legs. Then a slit is put in the back, at an equal distance from the floor, as the front legs and, by whittling the rear edge of the seat a little, it is inserted in the slit and the chair is as good and solid as if made in Grand Rapids.

A desk—such as an office desk—with a top to it may easily be made by the simple process of cutting the cover along one of the upper sand-papered edges, and tearing out the corresponding edge of the inside drawer. Matches are then punched through the four corners to hold the desk together and to form the legs. They will have to be cut somewhat, as this type of desk should only have legs about a half-inch long. By raising the lid of the cover there is the nicest open desk in the world. If the children wish to make a typewriter desk they have only to cut two slits in the cover, each about a third from the edge. When the cover is raised, the two outside shelves remain down just as the two standards of the office desk.

Bureaus, sideboards, and all sorts of furniture with drawers may be made by piling two or three boxes on top of each other horizontally and cutting away the outside sand-papered edges and inserting bits of matches for handles to pull the drawers in and out. The mirror or back to the furniture can be made from another box opened up with its inner cover forming this part, and glued to the backs of the drawers.

Once the children have been given a few models, they will invent more themselves. The great fun will be in making new things and discovering new uses for the little match boxes.

LIMA BEAN POD ANIMALS

Who would ever think that a lima bean pod was of any use? And who would think that it looked anything like an animal of any sort? But Mother has only to toss it into a dishpan full of water to see that it has many possibilities. In fact, her dishpan, filled with a collection of lima bean pods, may be a miniature aquarium or zoological park where the children can amuse themselves for hours making new fish and animals to suit their fancy.

First of all, with the edges of the pod stuck together, the little bean shell looks very much like a slimy little fish, with its nose pointed under the water—the fact that fish aren't green does not bother the children. Spread out on the water, with both sides open, the pod resembles a big bird with outspread wings. Cut in half, so that it is nearly square in shape, with small holes punched near the end, and floating on its side, the bean pod is a fat, green frog or toad.

If Mother doesn't want the children playing in water, the bean pods will make very good animals

on dry land. A few matches or toothpicks stuck in for legs, and we have hippopotamuses, pigs, and many other animals which have such thick necks that they are not unlike the bean pod in shape. With bits of matches stuck in the head for ears or horns, the little shells can be made to resemble cows, bunnies and deer, depending on the size and thickness of the pods. But Mother will not have to make many suggestions. The children, who are very imaginative and quick to see resemblances, will think of many more animals to make than she will. She has only to start them.

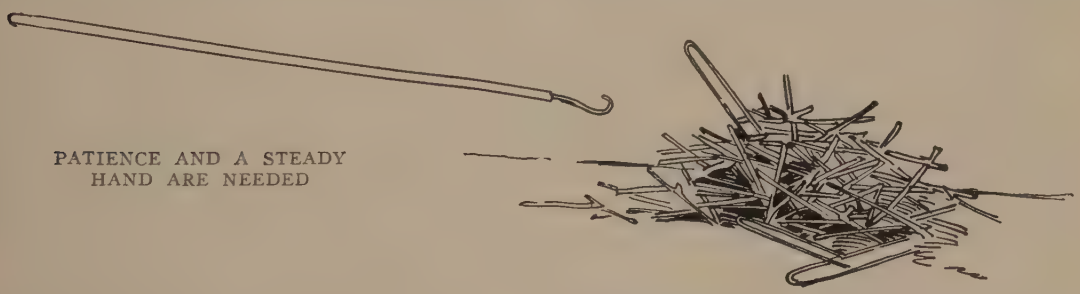
THE FUN WITH BEANS IS NOT ONLY IN EATING

JACKSTRAWS OF TWIGS

Jackstraws has always been one of the most absorbing games the children can play, but the idea that they can make a set of Jackstraws themselves, will come as a great surprise. A pile of the twigs, a few hairpins, and they have as fine a set as can be bought in the stores—or almost.

The twigs are broken into lengths of about three inches, the more crooked and the more gnarled and notched they are, the better. It will be a good plan to break off the twigs just where a branch is forming so that more variety in shape will be obtained. The "fishing-rod" is easily made out of a smooth, straight twig about three inches long with a bent hairpin, or a very large common pin stuck in the end.

The twigs are all gathered together and then dropped in a loose heap on the ground. It is the object of the players to "fish out" as many twigs as possible without moving any of the other twigs in the heap. The moment the player joggles any but the one he is fishing for, even the very least bit, he has to stop and let the next player have his turn. When the pile is quite new, it is very difficult to get many off without disturbing the whole heap, but after a time a player is able to take off several very successfully. The one having the greatest number when the whole heap has been picked up is the winner of the game, and it is his privilege to form the pile for the next game, and to have first turn when it is begun.



PATIENCE AND A STEADY HAND ARE NEEDED

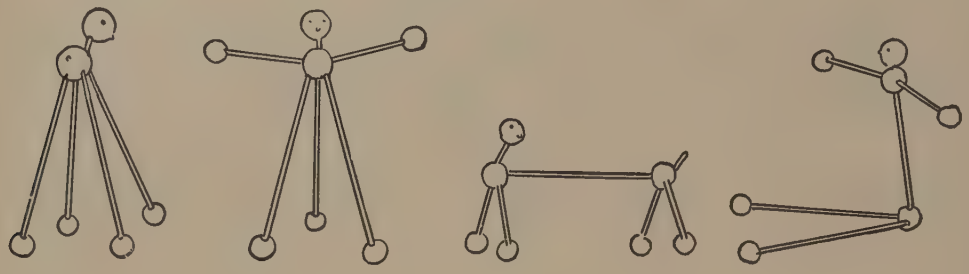
TOYS MADE OF GREEN PEAS AND TOOTHPICKS

Mother can easily spare a handful of the fresh peas she is preparing for dinner, to give the children something to play with on a rainy morning or afternoon. Particularly will the little tots like these small green playthings which, with the aid of a few toothpicks, will make the most adorable toys—just like little creatures out of fairyland.

Toothpicks for arms and legs, a bit of a tooth-

pick for the neck and you have a whole family of little tree nymphs or green Brownies or whatever are the children's favorite elfs. By sticking holes for the eyes and nose and mouth in the tiny green head, quaint faces may be made which will appear very realistic to the imaginative children.

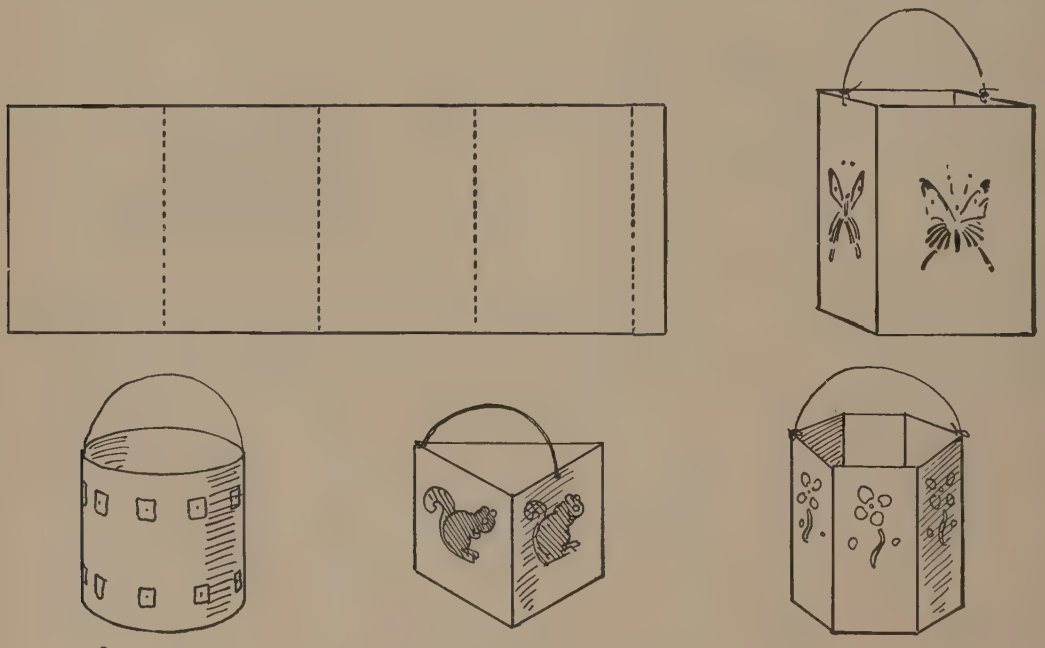
The older boys may also find that the green peas make fairly good marbles if they do not happen to have any others around. They will not last long, to be sure, but they will serve the purpose, and their very novelty will prove an additional attraction.



PAPER LANTERNS

No boy or girl has ever been to a lawn party or a hallowe'en party or a church social without longing to have some paper lanterns of his own just like those which made such beautiful decorations hung under the trees or in the shadowy corners of his hostess's house. And with a few pieces of colored paper or some crayons and paints, and a pair of scissors and a bit of string he can have some with very little trouble.

Lanterns of all shapes can be made, though the little children will find that the rectangular or square ones will be the easiest. For these a large sheet of paper—preferably colored paper—is taken and creased four times across, on the up and down



HOW TO MAKE LANTERNS

of the paper. The two edges of the paper are then pasted together and the rectangular lantern is made. If the children wish a square lantern, they must cut or fold the bottom of the sheet so that its length measures the same as the width of one of the sides which is to form the lantern. By punching a small hole in the top of each side in the center and inserting a piece of cord, the lantern may be hung up from the molding or the fireplace or one of the lighting fixtures. If, however, the children wish to use the lantern as a covering for the electric light bulb, they may just slip it over the lamp as they would a shade. The effect of the light shining through the colored paper is very pretty.

If there is no colored paper in the house, the children may make their lanterns out of white and draw or paint a design upon it. If they have paints or crayons, any simple design, such as a flower or a scroll or a cross may be used very effectively. Another very charming effect may be obtained by making the lantern of white paper, outlining a design upon it, cutting out the design, and pasting in back of the openwork pieces of colored paper. The light shining through this colored pattern is very quaint and artistic.

If Mother allows the children to use candles, they may make the entire lantern, lighting and all, themselves. To do this they must put in a rather stiff cardboard bottom to the lantern, cut from an old shoe box or the back of a writing pad. It is inserted in the framework of the lantern about an inch from the bottom. The edges of the framework are then folded in and pasted around it so that it will hold firm when suspended from a string. The candle is then placed carefully in the center and lighted.

Triangular lanterns may be made in the same way as the square by folding the sheet of paper in three even parts. Octagonal and round ones may also be constructed. In fact, once started the children will be eager to make all sorts of shapes and to draw all kinds of designs upon them.

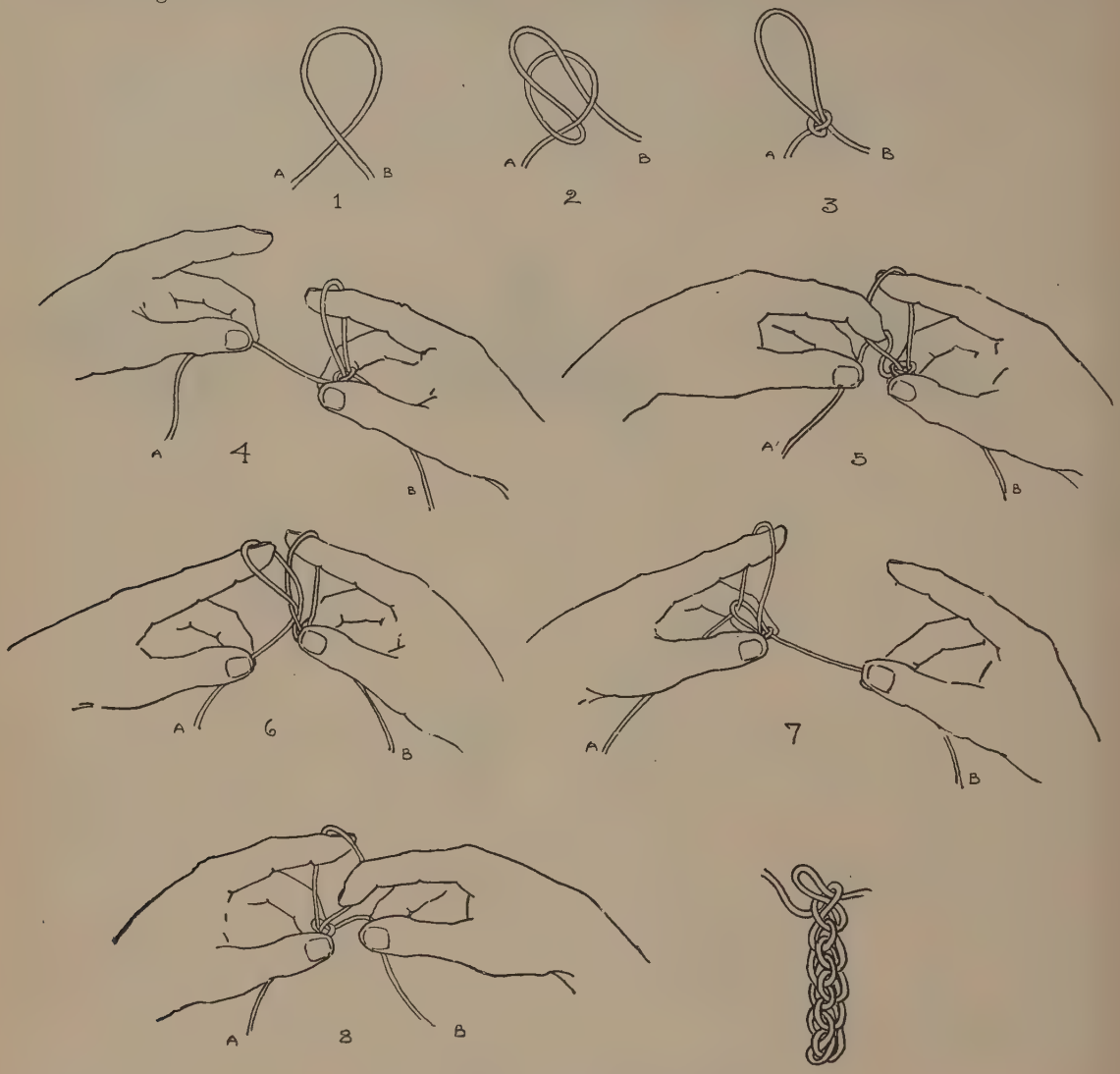
A simple, imitation lantern that small children delight to make is described by Mr. Shinn on page 93 of this book. These may be made of various colors, a string slipped through the handles, and the ends of the string fastened at opposite corners of the room, or if out of doors, from one tree to another. Decorations, thus made, are very effective for parties, and give the children the additional joy of anticipation.

HATS OF LEAVES PINNED WITH TWIGS

Milliners love to imitate the beautiful, natural foliage of the trees in making their spring and autumn hats, and if the children will follow their example, they, too, may have the most beautiful hats by using the real leaves themselves. The crowns of the hats are easily made by using the stems to hold the leaves together, looping or even tying them in a sort of loose chain. Care must be taken, however, to make the hats plenty large enough so that they will not tear when placed on the head. For the brim, if the children are ambitious to attempt brimmed hats, slender twigs should be used to pin the leaves together, so that some stiffness will be given to enable the leaves to stand out and not droop down over the face. These twigs should never be so heavy that they break apart the leaves.

Hats of all shapes can be made—from plain caps that fit close about the head, to fancy "leghorns" that every little girl adores to dress up in. In the autumn, when the leaves are all different colors, very beautiful effects may be obtained by combining the red and gold and brown shades. This game will be a test of the children's artistic taste and handiwork, as well as a source of amusement.

loop. The loop is put over the index finger of one hand and the knot is held between the thumb and middle finger of the same hand, with the sliding end held against the palm of the hand by the two remaining fingers. The tight end is grasped by the lower fingers of the other hand, the index finger is put through the loop from the inside out, and the tight end of the cord is pulled up, as if the finger were a crochet hook. With this second index finger raised in the air, the first loop is dropped off of the first index finger and the loose end of the cord pulled tight. The process is then reversed, and continues to the end, with the hands alternating their work.



HOW TO MAKE FLORENTINE BRAID

STENCILS

Stencils may at first be as much work for Mother as they are fun for the children. But after Mother has made a few, the older children will have caught on to the idea and will be able to cut some out for themselves for the little ones to play with. And a great deal of fun they are for the kiddies!

First, Mother takes a big sheet of paper, or

cardboard, out of which to make the stencils. Then she cuts from the paper or magazine or wherever she may find them, pictures of rabbits, of squirrels, of dogs, of horses, of bears, of people —any pictures which she thinks may interest the children. When these have been carefully cut she lays them on the sheet of paper and traces their outlines. This done, she cuts out the outlined figure and the remaining sheet, from which the little rabbit or bear has been taken, makes the stencil which affords so much entertainment for the children.

The first thing, of course, is for the children to guess what each stencil represents. The older boys and girls will do this very easily, but the little ones may have to puzzle quite a little while over this reverse picture. Then each child is given a stencil and a pencil or a crayon or even paints. Taking the pencil or crayon, the children lay their stencil on a blank piece of paper—just as Mother has laid her cut figure in the first place—and carefully outline it. With their colored crayons they may also color the whole figure if they like, or shade it with their pencils. Then they remove the stencils and see the results of their efforts. There will be considerable interest, Mother will find, in comparing the different drawings or paintings, as the small tots will probably discover that being an artist even with a stencil for guide is not so easy as it looks. The children may cut these figures out if they choose and put them away with their paper dolls. A barnful of paper animals will please the boys quite as much as a house full of paper dolls will please the girls.

The great advantage in having the stencils made of cardboard will be that once Mother has made a collection of them, she will not be bothered again, for the stiffer paper lasts indefinitely if the children are careful. Any old shoe boxes, backs of children's pads, old calendars, will serve very well for this purpose.

The stencils may be used singly or in combination to make designs. Borders are particularly attractive and can be used in the doll house as part of the wall paper. Herewith are some interesting silhouettes which may be traced on thin paper; then cut out the tracing for a pattern and proceed as above.

THE RAINY DAY BOX

BY LILLIAN B. POOR

IT CAME at Christmas—a Rainy Day Box—addressed to the mother of two energetic children who were blessed with the full quota of initiative usually attributed to wholesome, happy children of from five to ten years of age and who were frequently in disgrace owing to misapplied energy.

On the outside of the box was written the words, "To be opened on the FIRST RAINY DAY."

For a time the interest of the family was centered in the desire for a raging storm so that there might be no question about the moral right to open Mother's strange gift. At last the day came when there could be no question as to the weather conditions and the box was opened with joyous ceremony. Six neatly wrapped parcels came to light when the cover was removed, each one sealed and numbered.

A card was also enclosed upon which was written the statement, "Parcel No. 1 to be used on the FIRST RAINY DAY, No. 2 on the SECOND RAINY DAY, etc., the BOX with the rest of the parcels to be put away safely until needed."

Upon opening the parcels on successive rainy days, the children discovered that each contained simple, inexpensive things, but in each instance materials which furnished opportunity for self-expression, which would give legitimate outlet for stored-up energy.

In the first parcel—two pairs of blunt scissors, a pad of coarse paper, a dozen pictures selected from magazines or newspapers, to be used as cut-outs, in this way suggesting a source of unlimited material.

In successive parcels—two tubes of paste and a package of papers of varied shapes and colors.

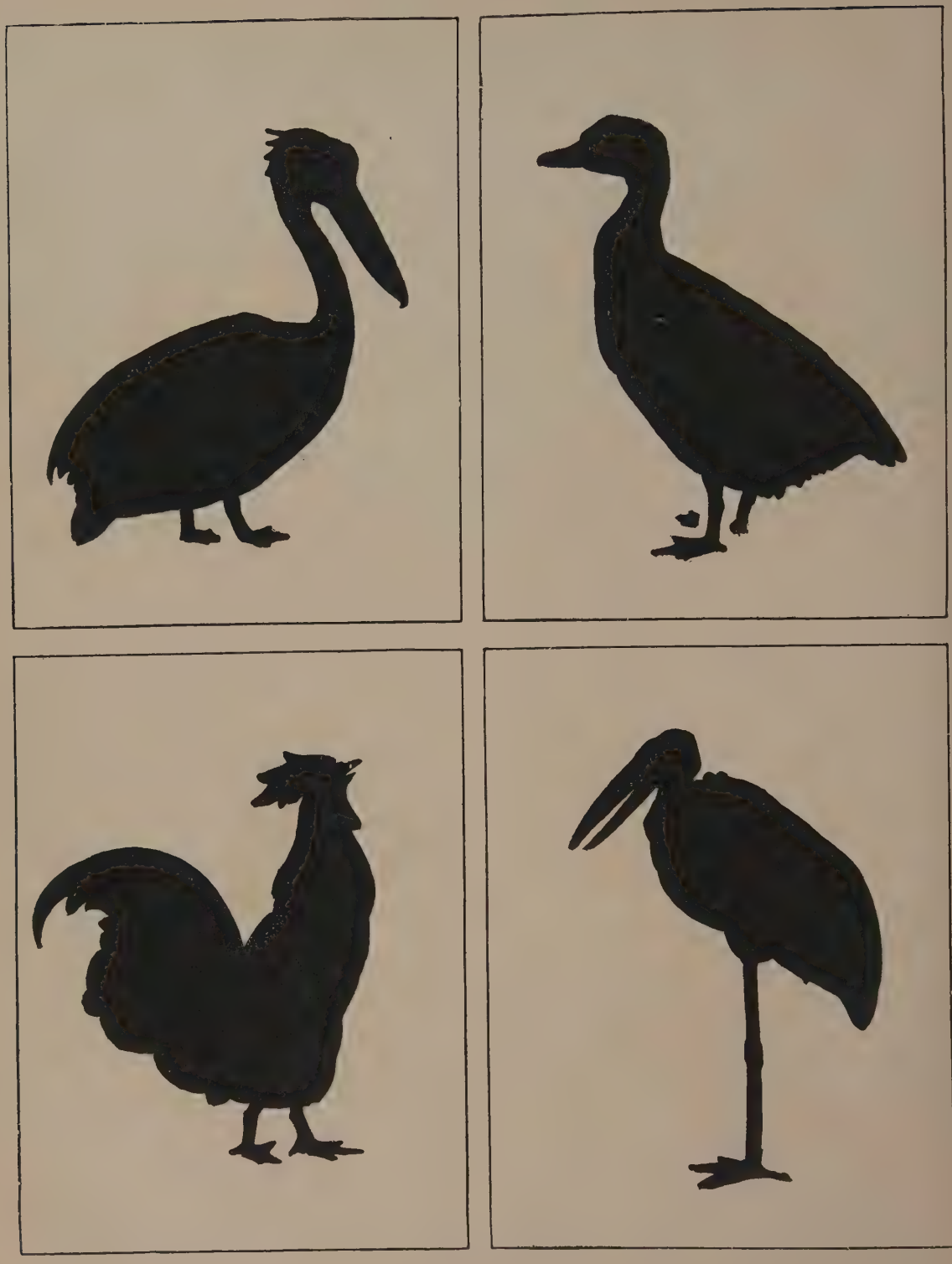
No. 3—Two clay pipes and a small cake of soap.

No. 4—One pound of plasticene for modeling.

No. 5—Two boxes of wax crayons; a pad of drawing paper, pictures to color, landscapes, dolls, doll dresses and animals.

No. 6—Several metal-tipped strings and two boxes of large glass beads differing in form and color.

Many other suggestive play materials could be included in such a box, always keeping in mind the number of children in the family, their respective ages and natural interests. Any mother would welcome such a gift as she plans occupation for a convalescent child, or as she looks ahead to the summer vacation. Better still, the children might do the collecting of their materials and either make a gift of a Rainy Day Box to



STENCILS I

STENCILS II

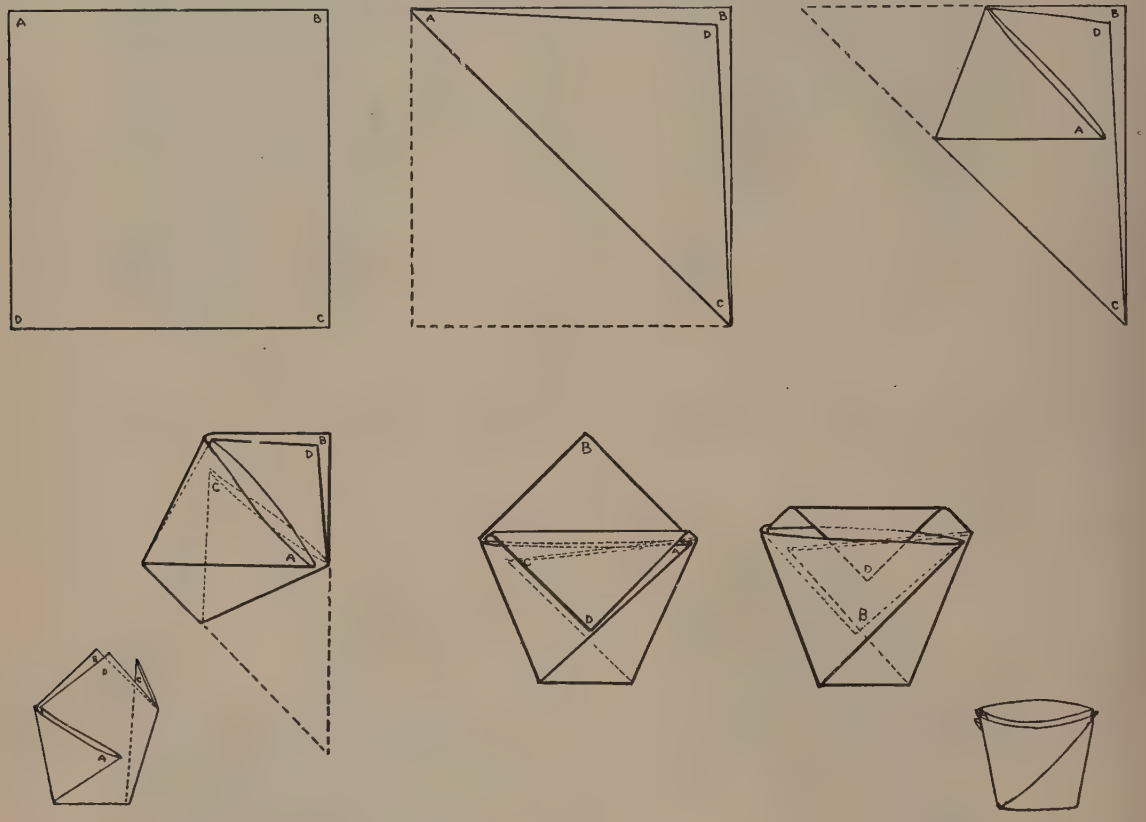
STENCILS III

STENCILS IV

some little friend or make one in the winter time and not open it until the long summer vacation has arrived. Children might be able to assemble such a Mystery Box from their own home material if it is not possible to secure it in any other way. It's worth trying.

FOLDING PAPER CUPS

Children should always be encouraged to make useful objects, and the folding of paper cups is one of the pastimes that may be classified as useful. Before going on picnics or in preparing for

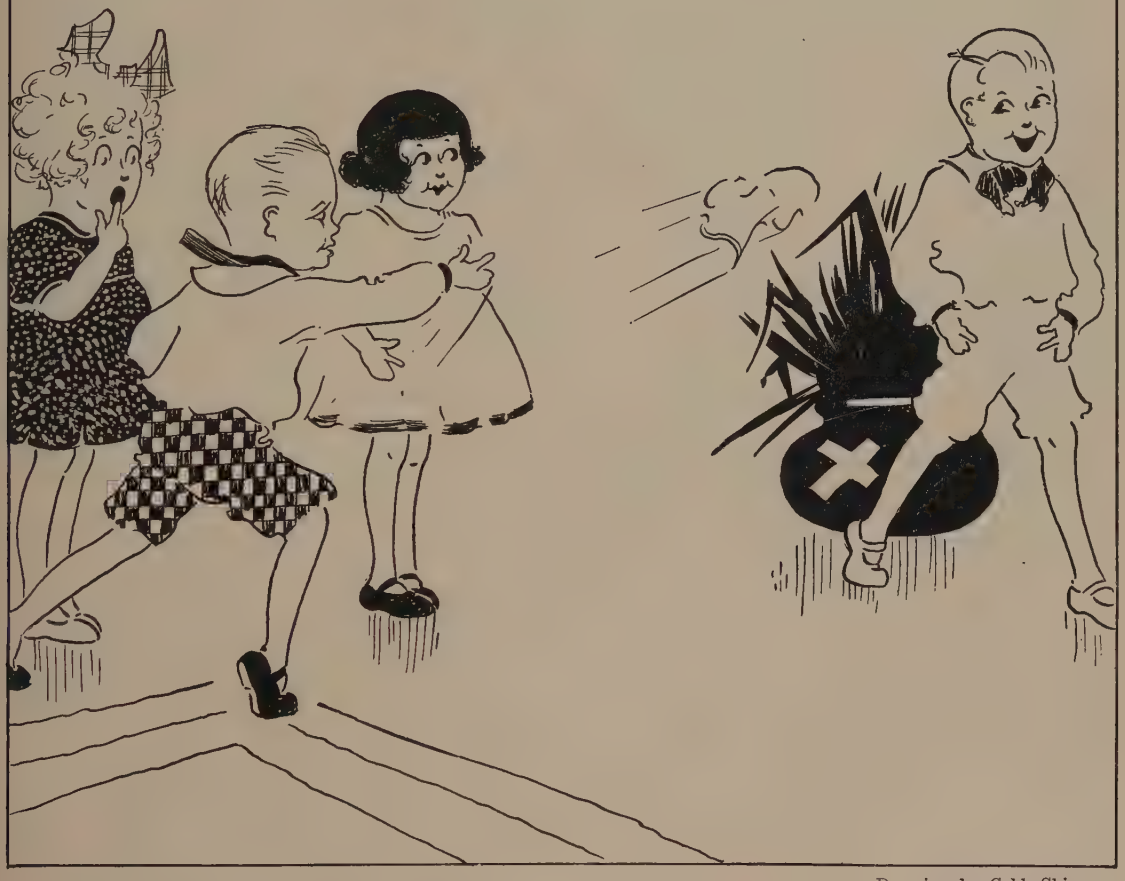


any outdoor parties where the taking of porcelain or china seems an unnecessary trouble, the children can amuse themselves for some time by making a supply of cups.

Sheets of clean paper are cut into from six to eight-inch squares, then folded diagonally, the edges being even. The long diagonal fold represents the bottom of the cup. In our illustration the four corners are lettered A, B, C, and D. D is folded to B, and AC is the bottom of the cup. A is then folded over to the opposite side, a little nearer to the point BD than to C. Turn over the paper and fold C as you did A on the other side. Now tuck B into the pocket made when C was folded over, and D into the pocket made when A was folded over. The cup is finished and is flat for carrying. To use, grasp the two sides in one hand, and round by inserting the fingers of the other hand in the opening at the top.

Writing paper is the best material for cups.

How Far Can You Throw a Handkerchief Without knotting or folding it?



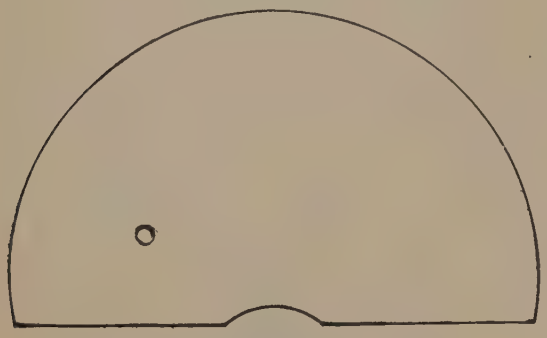
Drawing by Cobb Shinn

Here is a little game for your next party, or for you and your playmates to play some rainy day. To throw a handkerchief very far without folding or knotting it is not nearly so easy as you would at first think.

MAKING DOLL-DRESSES

BY MRS. BERTHA PAYNE NEWELL

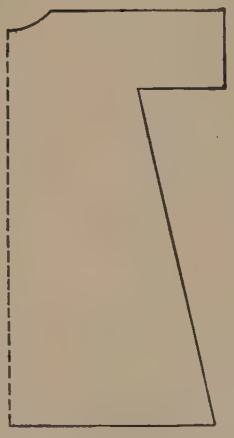
THE doll plays a large part in childhood: the beloved companion of the three-year-old, the actor in the dramas of the four-year-old, and



TWO WAYS OF MAKING A KIMONO

these and more to the older child; for now a doll is to be not undressed and left lying in cold nakedness, as is so often the case earlier. It is to be dressed as well, and clothes made to order.

For doll's dressmaking and for acting plays the small dolls are much the best.



First, without sewing, try this pattern shown me in my childhood by a young lady who seemed to me then the most beautiful creature that ever walked the earth.

That such a being should condescend to show me how to improve on my first attempts at dressing seemed a miracle. I pass on the pattern. The glamor it still holds is my own.

Cut a circle of cloth. Fold it in half, in half again. Snip off the corner at center. Open and put doll's head through opening. Cut two tiny armholes.* Put doll's arms through and tie with a sash.

Kimono from Half Circle

Cut a half circle of cloth. Wrap it around doll's shoulders, straight edge at neck. Cross over in front and snip armholes. Pin a belt or tie a sash around the waist.

Kimono Pattern

Fold a sheet of paper in half. Lay doll on it, neck across folded edge, arms outstretched. Cut across bottom at ankles, across width at wrists of doll. Shape out under arms and slope outward to edge of skirt. Take up doll. Fold pattern in half lengthwise. Cut a semicircular hole at angle on folded edge for neck opening. Cut a slit downward from this for opening.

It needs a bit of thinking for a child to work this out in paper and then in old cloth, until she learns to leave what seems an unnecessarily wide allowance for sleeve and body widths. She does not realize how much cloth is taken up in covering the thickness of these members.

I think it is a good plan to let children try their own ways of cutting and fitting and fastening up the dresses, until they have some notion of the difficulties and have tried their own devices to meet them. That is the order Nature imposes on us in all invention. Then after this trying the patterns are appreciated.

Another way to get at a pattern would be to let the little girl lay her own kimono out straight and cut a pattern free-hand in miniature.

Clothespins make good dolls, especially when many are wanted, as for a party or wedding, or a procession, or to fill the streets of Sand-Table Town. With gray skirts and white capes and circular caps gathered at the outer edge into a "mobcap," these look like Puritan women. Features may be marked in pencil or wax crayon.

*We used to make this arm-opening by folding the goods and cutting a V-shaped notch. This gave the effect of a sleeve, the apex of the V coming at the doll's wrist and the wide part at the shoulder.—*J. E. B.*

Fill a plate with common navy beans and then give each player a table knife. The one who is able to carry the greatest number of beans on his knife over a certain route wins. The more obstructions you place in their path, the more fun you have playing the game.

THE WONDERFUL USES OF COLORED PAPERS

BY BONNIE E. SNOW

THE world over, children are interested in colored papers. How eagerly they seize upon the pink wrapping of a bottle from the drug store, the green lining of a box, or the violet inside of an envelope which has come from foreign parts! What possibilities they imagine when they discover that Father's shaving soap is wrapped in a paper which bends and wrinkles, but which can be smoothed out with the fingers until it looks like silver! What shining moons, what crystal lakes, what splendid mirrors can be fashioned from these carefully treasured pieces! The bright eyes of children are quick to see color anywhere. Children are as inevitably drawn to color as are steel filings to a magnet.

Colored papers precede the paint box as an instrument through which lessons in color arrangement and color harmony may be taught. They are much easier to care for, they are not messy, and their technique or method of handling comes natural to the average child. Give him scissors and a newspaper and he gets busy. Give him scissors and colored papers and he is busier and happier. Give him scissors and several bright colors of paper and he becomes the busiest and happiest designer in the world, for he cuts shapes and arranges them to suit a hundred fancies. Flowers, animals, landscapes, the human figure, the simple geometric shapes of the kindergarten equipment, all feed his imagination, and he produces arrangements which are to him full of meaning, interest, and delight.

"Mother, what is the shape of a cloud?" asked a child, busy with scissors and paper. "A cloud, my dear? Clouds are of many shapes. Why do you ask?" said the mother. "Because I am making a picture of the blue sky, and I want to put in a pretty white cloud," said the child. So the mother found a picture showing sky, cloud, hillside, and winding road, all mere shapes which could be cut from paper and assembled to make a picture. The child thus learns that everything that is seen has form or shape, and that picture making and design are but the thoughtful study and arrangement of shapes and colors.

A Landscape in Cut Paper Shapes

The color plate facing this page suggests a few of the many delightful exercises which children of kindergarten age can work out with a little help from the mother or teacher at the start. It is desirable that papers of good color quality be provided, although children are made happy through the use of colored papers which they have themselves collected, in ways already suggested. The school and kindergarten supply houses now offer excellent colors in inexpensive papers. With young children, strong bright tones of the six leading colors—yellow, red, blue, green, orange, and violet—are preferred, together with a supply of the neutral tones, black, white and gray. All these colors are provided in papers of various sizes. Perhaps the most convenient form is an assortment of all the colors mentioned in packages of 100 sheets, each cut 9 x 12 inches.

A good quality of paste should also be at hand, in tubes if possible. Homemade flour paste will do, but it is almost sure to result in smeared designs, hands, faces, and dresses. Again, flour paste is white and opaque and discolors a surface, while tube paste is transparent.

Figure 1 in the color plate is a simple form of landscape, showing a field, a tree, a distant hill, and the sun. There are five shapes cut separately in this design. A sheet of 9 x 12-inch manila or white paper is selected for the background, upon which the five shapes are to be pasted. First the color for the sky is selected. The simplest way is to cut a piece of this color, the same size as the background—in this case 9 x 12 inches. A little paste is placed at each of the four corners and a bit more halfway between the corners. The sheet is then pressed against the background, the edges and corners matching exactly. Next, select the color for the foreground (the field) and cut a rectangle 9 inches wide and about 5 inches high. Paste this across the lower end of the background, so that the edges meet, leaving about 7 inches of sky uncovered. (Place paste only at the corners and at intervals near the edges; never cover the entire back of a shape with paste.)

We are now ready for the shape which represents the distant hill. It may be of blue, gray, or violet. In width it matches the width of the background, and it varies in height at different points to represent the gently undulating line of this particular hill. The children may practice cutting "distance" as it is called, until they have a satisfactory shape. This hill shape is pasted directly over the line where the field (foreground) and sky come together.

A fine, large tree shape is next cut from dark green paper. This also will take practice, but it

Fig. 1

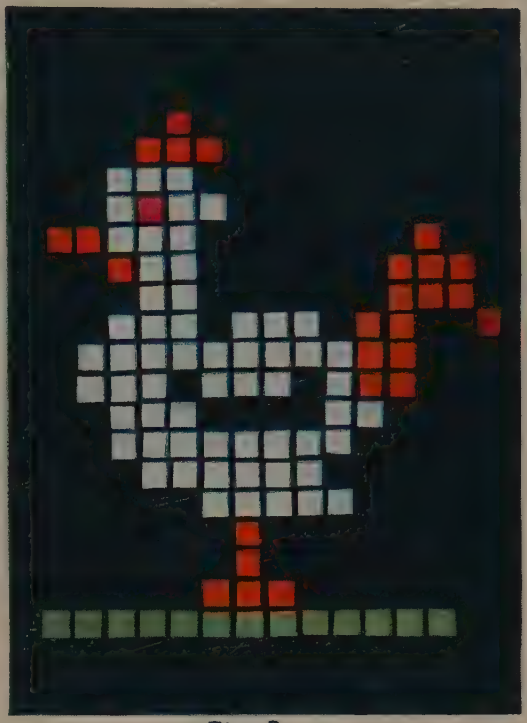


Fig. 2

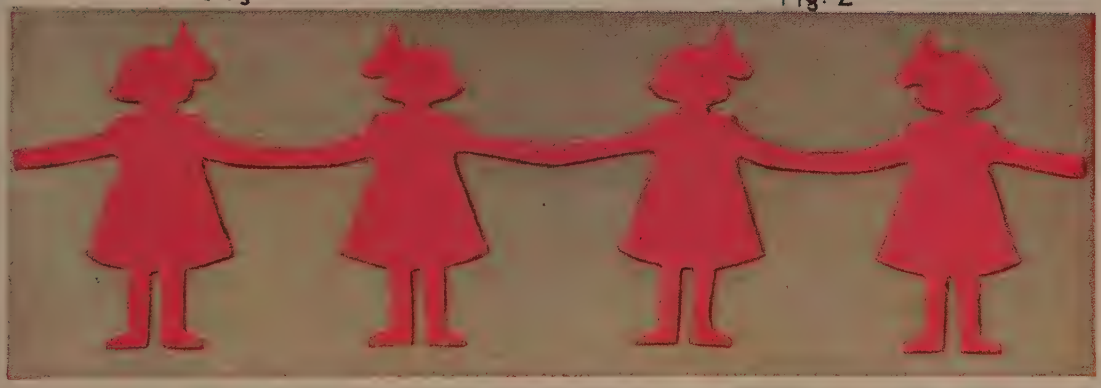


Fig. 3

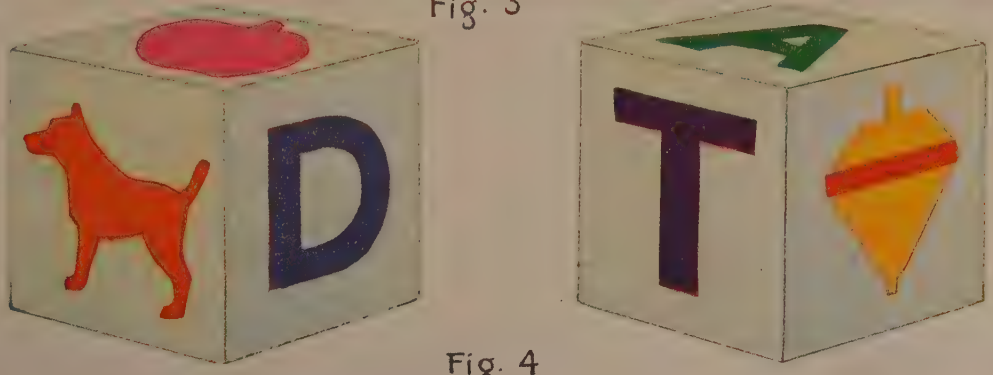


Fig. 4

is practice that is valuable, for the children's attention will thus be called to the shapes of different trees—the elm with its umbrella-shaped top, the pine which is like a cone, the sturdy oak, and the spreading apple tree. The trunk or stem of the tree is less than half the entire height, and a wavy line at its base will suggest the break in the ground that occurs where the trunk enters. Paste the shape of the tree so that the base of the trunk is seen below the lower line of the hill or distance, and be sure that the tree shape is neither exactly in the middle nor too far to one side.

The sun (or moon) may be cut by placing a penny or a five-cent piece on orange or yellow paper, tracing around the coin with a light pencil line and cutting on the line. This round shape is to be placed just above the upper line of the hill, neither exactly in the middle of the picture nor too far to one side.

These landscape compositions may be varied infinitely. A sea-picture is even easier to make than a landscape, as it involves only gray-blue or gray-green paper for the sky and a deeper tone of the same color for the water. The moon or sun may be yellow, red, or orange. A boat shape of black with a white sail is always an exciting addition.

Children enjoy looking at pictures of out of doors, and the attempt to express what they see by means of cut paper shapes provides training in perception, in judgment, and in taste.

An Animal Form Made of Small Squares of Paper

Another exercise which keeps little minds and fingers busy is illustrated in Figure 2 on the color plate. The form of the young rooster is obtained through the careful counting and laying in place of half-inch squares of paper. A four-inch square of red paper was ruled into half-inch squares by setting off spaces a half-inch apart on each edge, and connecting the dots opposite each other by lightly ruled lines. Two four-inch squares of white paper were ruled in the same way. Cutting on all these lines results in the material required for this picture—a number of small squares of green, red, and white paper. There are twice as many white squares as colored. For convenience in handling, each different color should be placed in a saucer or small box.

For the background upon which these squares are to be pasted, a 9 x 12-inch sheet of black or gray paper, ruled in half-inch squares, must be provided. (The mother or some other older person must do the measuring and ruling for this.) The child should have the picture before him, also the sheet of black or gray squared paper. Starting three squares up from the bottom and one square in from the left edge, he pastes a row of small green squares. There are thirteen in all. They are in a straight row. Their vertical edges will touch, so that no background shows between them. (In the illustration a black line between was necessary in order to show squares instead of a strip of green paper.) These thirteen squares form the ground line upon which our young rooster stands. Count seven squares from one end of the green strip. Exactly above the seventh square place a red square. On each side of this, paste another red square. Above the middle red square, paste two more red squares, one above the other. This makes a leg for the rooster to stand upon. In this way, counting the squares and spaces to the right and left, the form of the rooster is completed.

Children have shown remarkable ingenuity in arranging squares to suggest birds, trees, butterflies, houses, or indeed any shape with which they are familiar. It is easy to see the relationship between such arrangements and cross-stitch patterns. In fact, many suggestions for this work can be gained from sheets of cross-stitch designs.

The size of the squares used by children in laying these patterns may be increased to one inch, but the use of squares less than one-half inch in size should be avoided.

A Border of Paper Dolls

A border of doll shapes, all holding hands, may be cut from colored paper. These borders are quite decorative in character and may be mounted upon strips of white or black paper and used for bookmarks, place cards, etc.

To make a border of four dolls, take a strip of thin colored paper about six inches long and three inches wide. Fold the short edges together. Crease the fold. Do not open. Fold the crease to meet the open edges. Crease this new fold but do not open. Fold once again and crease well. On this last crease, cut the shape of half of a doll's head, the neck and the arm. Cut through the folded edges. Then begin again, a little below the last cut. Cut the under line of the arm, one side of the dress, and one leg and foot. Now open the paper. You have four dolls, all holding hands.

Alphabet Blocks Decorated with Cut Paper Shapes

Perhaps the most fascinating of all cut paper work is the making of cubical blocks with cut paper letters and decorations pasted upon the

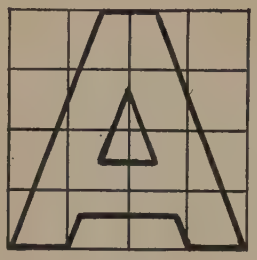


Fig. 1

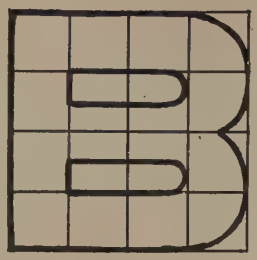


Fig. 2

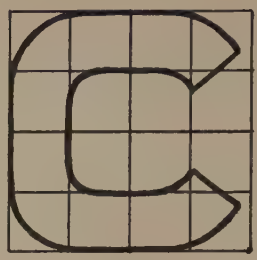


Fig. 3

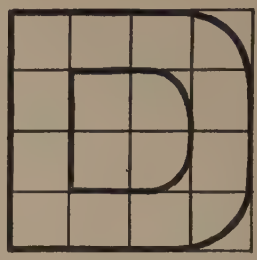


Fig. 4

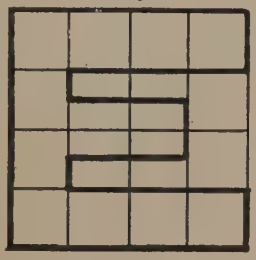


Fig. 5

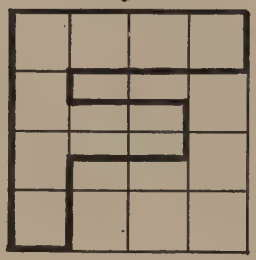


Fig. 6

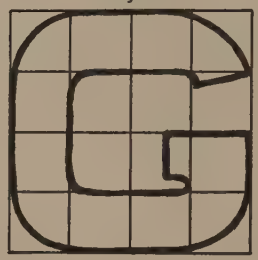


Fig. 7

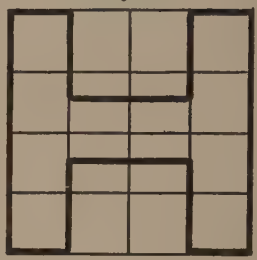


Fig. 8

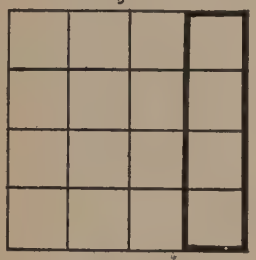


Fig. 9

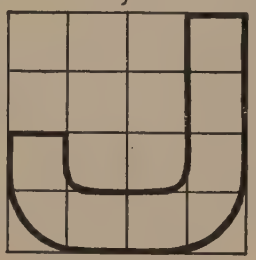


Fig. 10

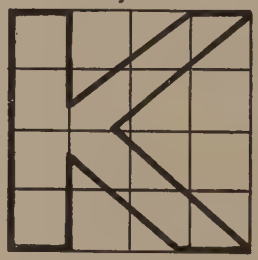


Fig. 11

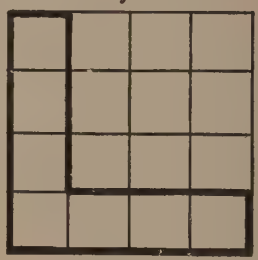


Fig. 12

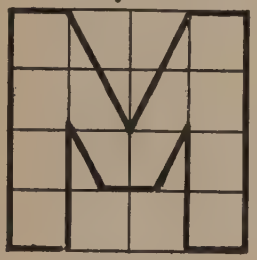


Fig. 13

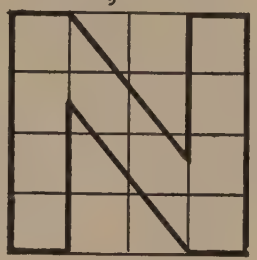


Fig. 14

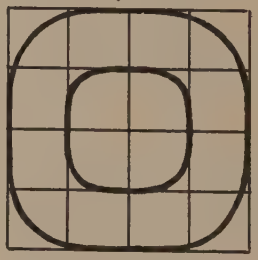


Fig. 15

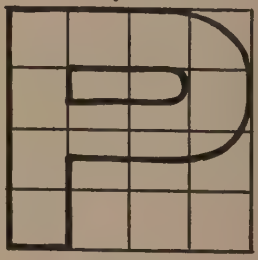


Fig. 16

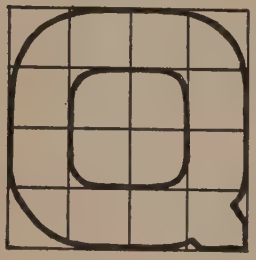


Fig. 17

Fig. 18

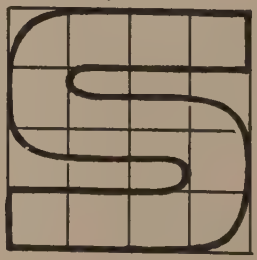


Fig. 19

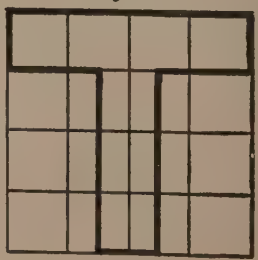


Fig. 20

Letters Cut from four-inch squares of paper folded into sixteen small squares

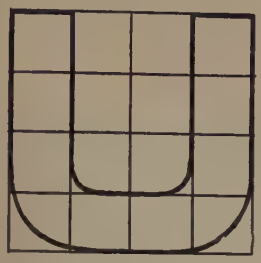


Fig. 21.

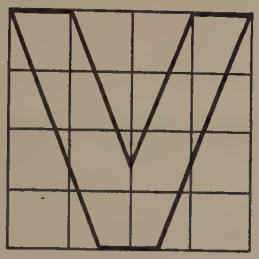


Fig. 22

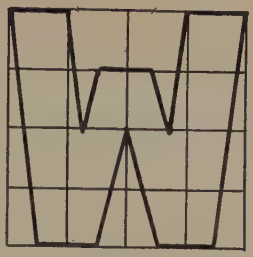


Fig. 23

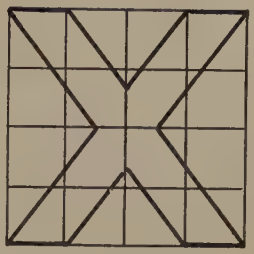


Fig. 24

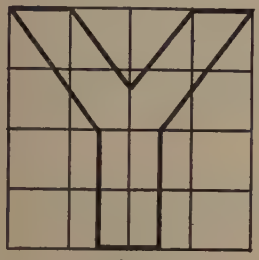


Fig. 25

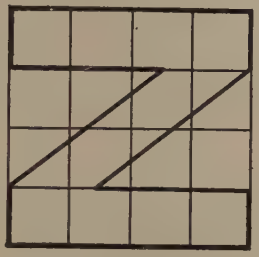


Fig. 26

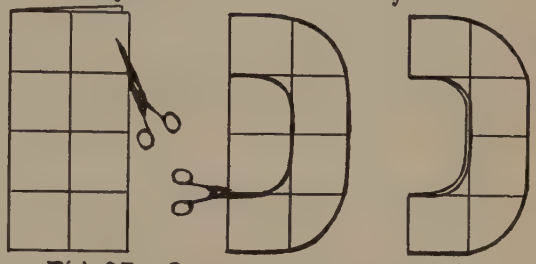


Fig. 27 - Steps in Cutting Letter O

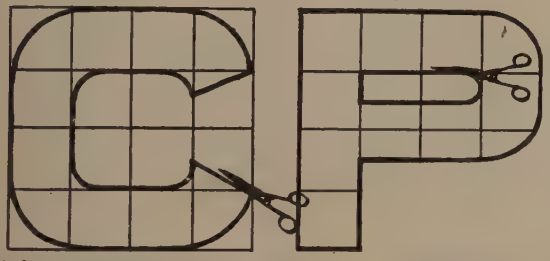


Fig. 28 - O Modified to Make C

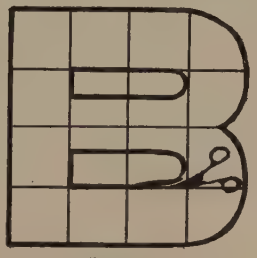


Fig. 30

Fig. 31

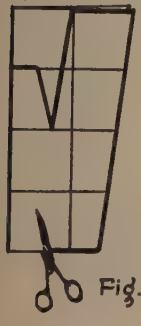


Fig. 32

Fig. 33

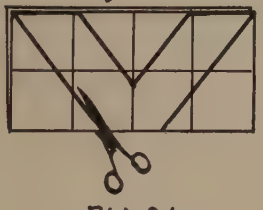


Fig. 34

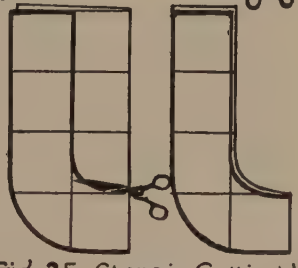


Fig. 35 - Steps in Cutting Letter U

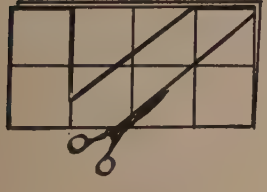


Fig. 36

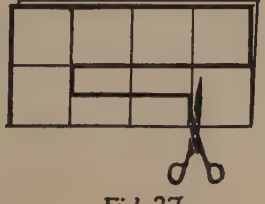


Fig. 37

Fig. 38

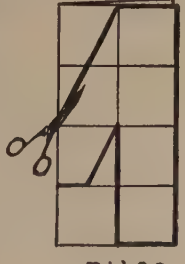


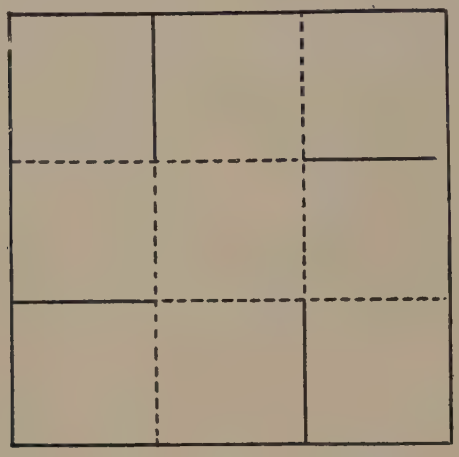
Fig. 39

Fig. 40

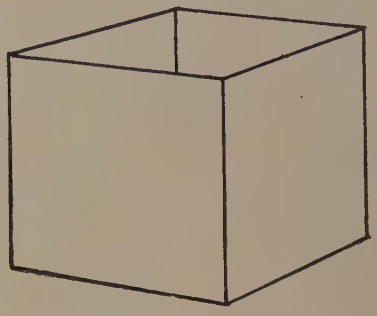
Letters cut from four-inch squares of paper folded into sixteen small squares

sides. These blocks may be folded, cut, and pasted by children of kindergarten age. They may be used for building, for word making, or for picture blocks. The letters and pictures are also cut by the children from colored paper. Figure 4 in the color plate shows two views of one block, made from white drawing paper with letters and shapes cut from bright colored papers.

To make one block, two six-inch squares of drawing or construction paper are required. On each edge of the two squares, set off two-inch spaces. Connect opposite dots by lightly ruled lines. (See A, Figure 5.) Fold on the dotted lines, cut on the full lines. Fold each square into a hollow cube. Fit the edges accurately and paste the sides together. (See B, Figure 5.) Fit one cube inside of the other, and you have a firm two-inch block.



A



B

Fig. 5

The letters for the sides of this block may be cut from two-inch squares, folded into sixteen small squares, following the directions given below. The shapes of the objects suggested by the letters may also be cut from two-inch squares of colored papers. Three letters and three shapes are placed on each block. Nine blocks are necessary to complete the entire alphabet.

AN ALPHABET TO BE CUT FROM PAPER

BY BONNIE E. SNOW

Block letters of simple but beautiful proportions, like those illustrated on pages 158 and 159, may easily be cut from squares of paper. These squares should be accurately measured and cut by the mother or some other older person, or better still, should be purchased in packages of one hundred squares in some bright color, as red. Squares prepared at home, ruled and cut from cheap manila paper, may well be used for preliminary practice.

Children of kindergarten age find no difficulty in folding a four-inch square into sixteen small squares. To do this, place the square straight on the table before the worker. Fold the lower edge to meet the upper edge. Crease. Unfold. Fold the lower edge to meet the middle crease. Crease. Unfold. Turn the square halfway around. Fold the lower edge to meet the middle crease. Crease. Unfold. Turn the square quarter way around and repeat these three folds.

Having the squares thus divided into diagrams or smaller squares, the children can easily be taught to cut every letter in the alphabet.

It is best to begin with the letters of simple construction, such as I, L, T, etc., rather than with the more difficult A, B, etc.

Many of the letters of the alphabet are alike on the left and right sides, and can best be cut on a vertical fold. A, H, M, O, T, U, V, W, X, and Y belong to this class. C, G, and Q are modifications of O. A few of the letters are alike

top and bottom, and can be cut on a horizontal fold, as in B, E, K, H, and X.

Figures 27 to 40, on page 159, show some of the folds most helpful in cutting certain letters. Figure 38 shows the fold for Y. Figure 39 shows the fold for M. Figure 40 shows the fold for H. (H may also be cut upon a horizontal fold.)

The mother must cut these letters with and

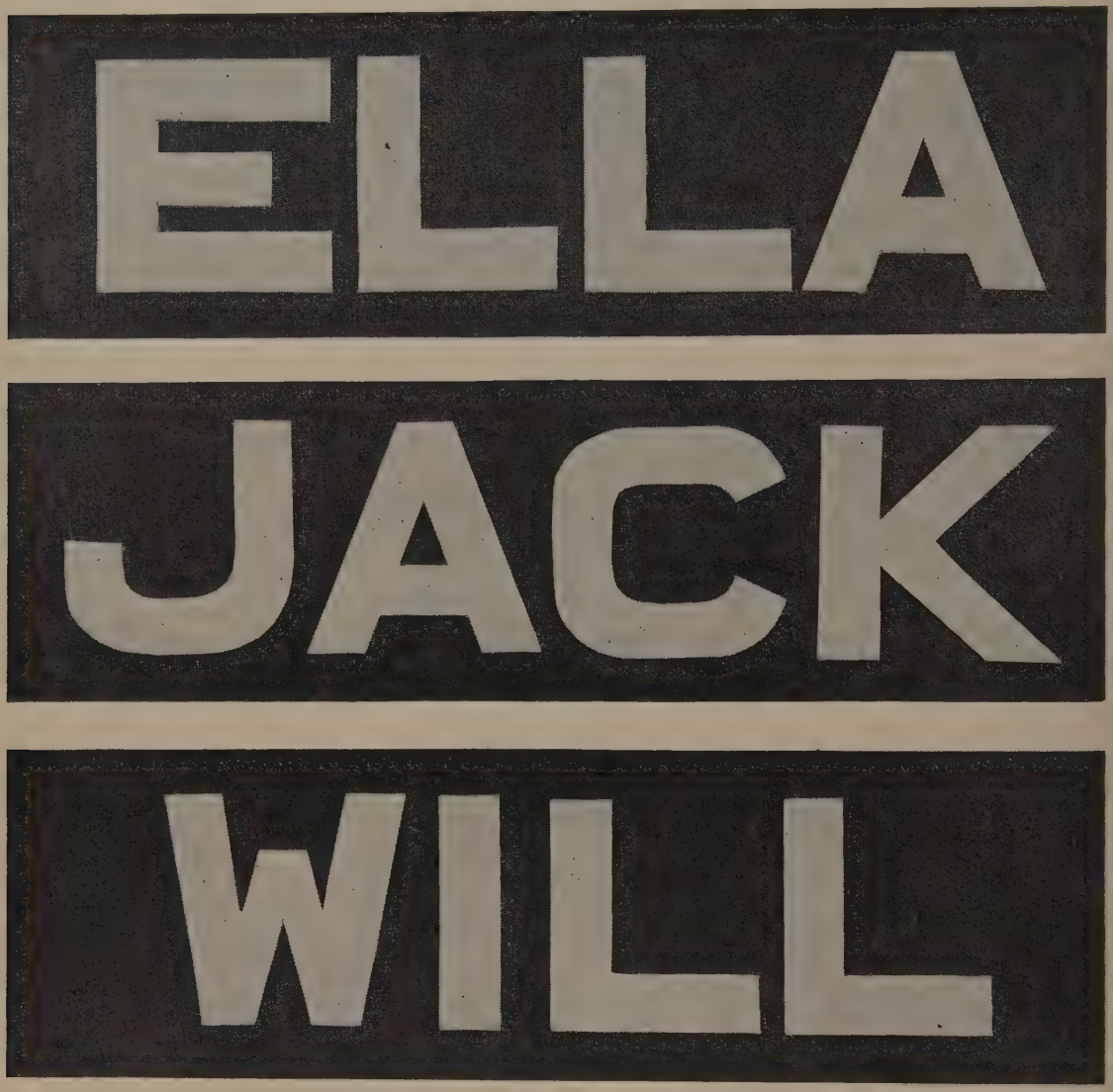
ure 27 shows the steps in cutting the letter O. Figure 28 shows how O may be modified to make C. Figure 29 shows how the scissors must be used in cutting out the opening in the upper part of P. Figure 30 shows the same process in cutting B. (This letter might be cut upon a horizontal fold.) Figure 31 shows the fold for T. Figures 32 and 33 show the folds and cuts for W. Figure 34 shows the fold for X. Figure 35 shows the fold and cuts for U. Figure 36 shows the fold for K. Figure 37 shows the fold for E.

for the child until they are memorized. This will be accomplished in a surprisingly short time. When letters of smaller size are desired, take three-inch, two-inch or even one-inch squares, fold into sixteen small squares and follow the diagrams given. Children should first cut and memorize the forms of the four-inch letters, however, before they are asked to cut letters in smaller sizes.

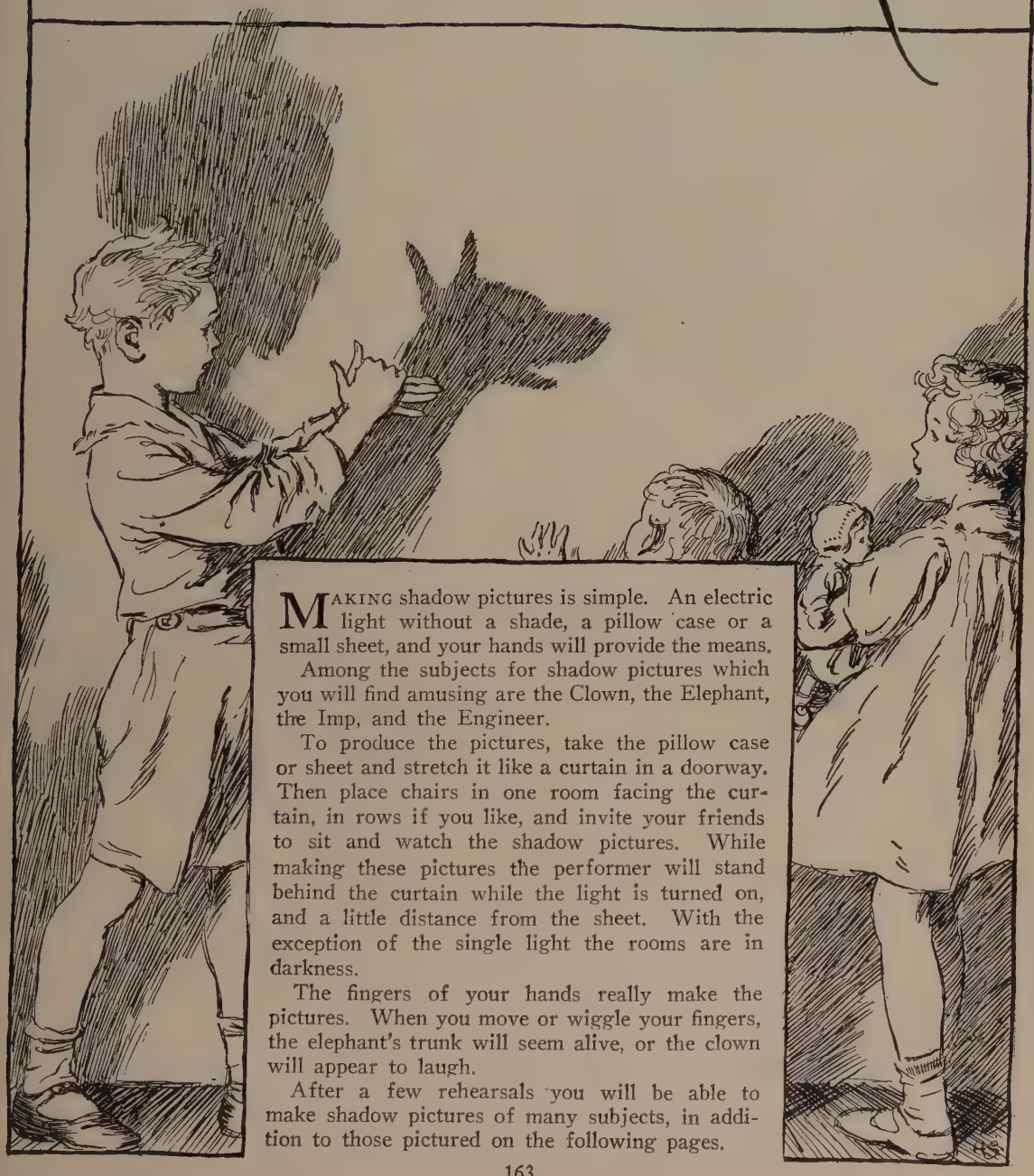
The uses to which these cut-out letters may be put are endless. Children delight in cutting the

letters of their own names, spacing the letters carefully and pasting them upon a background of contrasting tone, as shown on pages 161 and 162. Cut-out letters may also be used to form words, slogans, and even sentences, through similar arrangements. They may be pasted to the sides of building blocks, in connection with appropriate pictures, as described on page 157. They may be used for making the pages of an Alphabet Book (A is for Apple, B is for Ball, etc.), mounting the cut-out letters and shapes on sheets of uniform size.

As an aid to reading and spelling, the cut-out alphabet is invaluable. The ease with which the letters may be shifted about, their large size, the small space which the letters occupy when they are gathered up and put away, the fact that they have been folded and cut by the children themselves, all combine to make this device of especial educational value.



SHADOW PICTURES



MAKING shadow pictures is simple. An electric light without a shade, a pillow case or a small sheet, and your hands will provide the means.

Among the subjects for shadow pictures which you will find amusing are the Clown, the Elephant, the Imp, and the Engineer.

To produce the pictures, take the pillow case or sheet and stretch it like a curtain in a doorway. Then place chairs in one room facing the curtain, in rows if you like, and invite your friends to sit and watch the shadow pictures. While making these pictures the performer will stand behind the curtain while the light is turned on, and a little distance from the sheet. With the exception of the single light the rooms are in darkness.

The fingers of your hands really make the pictures. When you move or wiggle your fingers, the elephant's trunk will seem alive, or the clown will appear to laugh.

After a few rehearsals you will be able to make shadow pictures of many subjects, in addition to those pictured on the following pages.

SWAN

EAGLE

A BIRD FLYING

DUCK

GIRAFFE

BULL

DEER

ELEPHANT

HORSE

WOLF

DONKEY

GOAT

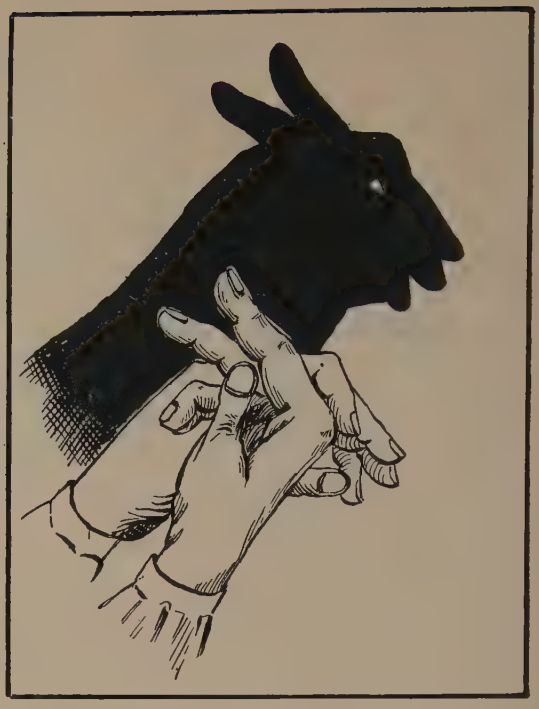
JUDY

OLD MAN

OLD WOMAN

IMP

RABBIT



RABBIT EATING

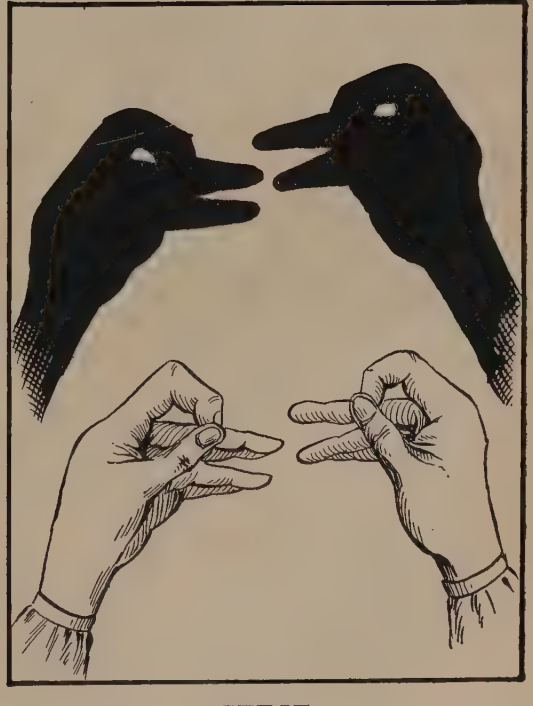
DOG

CAT

SNAIL

CAT

ROOSTER



GEESE

INDIAN

TEACHER

JOCKEY

FISHERMAN

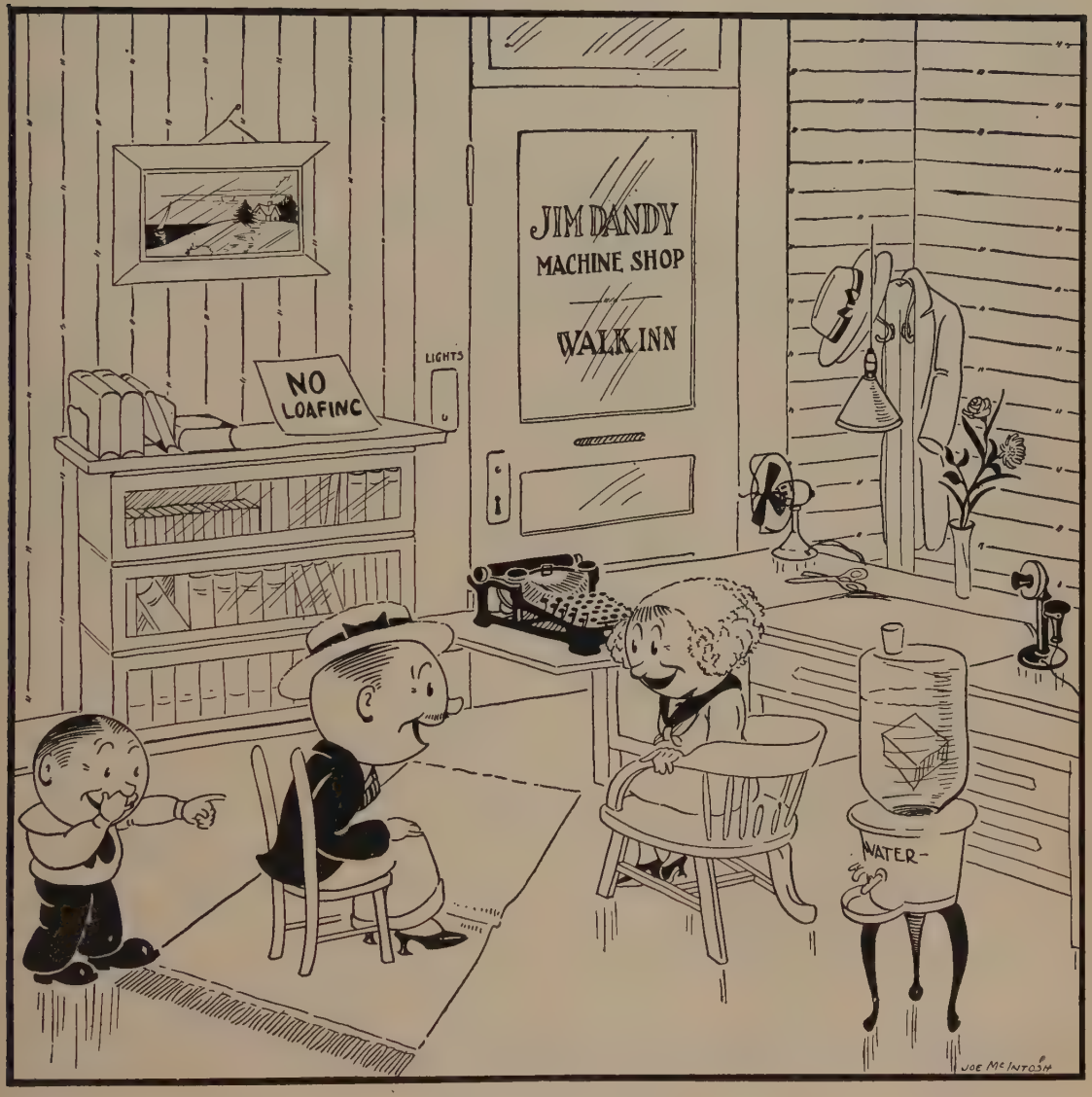
ADMIRAL

ENGINEER

CLOWN

THE HIRED MAN

WHAT'S WRONG WITH THIS PICTURE?



PICTURE NUMBER 1

What is wrong is listed on page 183

WHAT'S WRONG WITH THIS PICTURE?

PICTURE NUMBER 2

What is wrong is listed on page 183

WHAT'S WRONG WITH THIS PICTURE?

PICTURE NUMBER 3

What is wrong is listed on page 183

WHAT'S WRONG WITH THIS PICTURE?

PICTURE NUMBER 4

What is wrong is listed on page 183

WHAT'S WRONG WITH THIS PICTURE?

PICTURE NUMBER 5

What is wrong is listed on page 183

WHAT'S WRONG WITH THIS PICTURE?

PICTURE NUMBER 6

What is wrong is listed on page 184

WHAT'S WRONG WITH THIS PICTURE?

PICTURE NUMBER 7

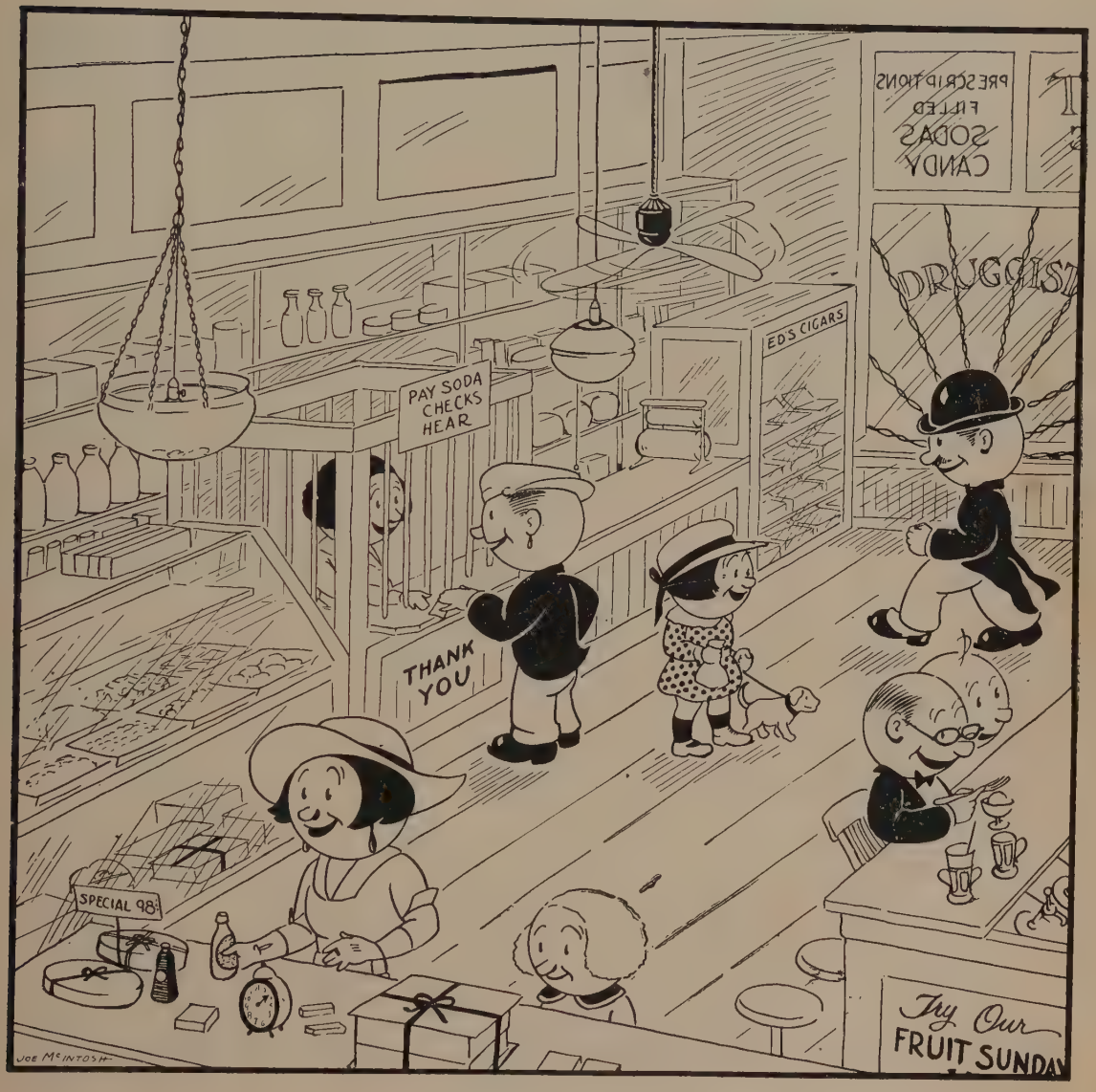
What is wrong is listed on page 184

WHAT'S WRONG WITH THIS PICTURE?

PICTURE NUMBER 8

What is wrong is listed on page 184

WHAT'S WRONG WITH THIS PICTURE?



PICTURE NUMBER 9

What is wrong is listed on page 184

WHAT'S WRONG WITH THIS PICTURE?

PICTURE NUMBER 10

What is wrong is listed on page 184

ANSWERS TO "WHAT'S WRONG" PICTURES

PUZZLE NO. 1

Not a machine shop.
Sign on wrong side of door.
Word "inn" should be "in."
No door knob.
Hinges on wrong side of door.
Nothing holding electric light.
One fan blade missing.
Flower in vase has two different kinds of leaves and flowers on one stem.
Telephone receiver upside down.
One leg of chair doesn't match.
Rounds of chair broken.
One blade of scissors too long.
Man's chair has no back.
Man has a woman's shoes on.
Man has his hat on indoors and in presence of lady.
Bow on hat band on wrong side.
Fringe on one end of rug missing.
Wall paper doesn't match.
Word "loafing" misspelled on sign.
Impossible to put large piece of ice in such a bottle.
One side of picture frame missing.

PUZZLE NO. 2

Wrong kind of tail on pig.
Apples growing on a bush.
Ducks do not roost in trees.
Wrong position for a bird's feet when flying.
Mule's head is so large it could not get through the window.
Chicks cannot swim.
There are shoes on the pig.
Sign misspelled.
A man's ear is backwards.
Owl out in the daytime.
One ear on the rabbit is longer than the other.
Cow is getting up wrong.
Two kinds of leaves on one tree
Wrong kind of feet on the duck.

PUZZLE NO. 3

Man's pants legs don't match.
Valve wrong on automobile inner tube.
Hammer head put on wrong.
Man's ear is backwards.
Dog has wrong kind of tail.
Man is smoking cigar and pipe at the same time.
Word "glass" is misspelled on box.
Wrong kind of feet on duck.
Pears do not grow on bushes.
Arm of man on box upside down.
Spoke missing in automobile wheel.
Gutter on garage upside down.
Handle on pail wrong place.

PUZZLE NO. 4

Word "the" misspelled on show sign.
The cent sign misplaced on ticket booth.
Ticket seller using wrong end of megaphone.
Flags blowing in opposite directions.
Peddler has banana sign but is selling apples.
Peddler has six fingers on one hand.
One of the bunch of balloons is not fastened.
Man in distance has one short and one long pants leg.
Man in foreground is smoking a pipe and cigar at the same time.
Man in foreground has cap on backwards.
Rope should not be across entrance.
Stripes on man's pant legs do not run in same direction.
A flower does not have two different kinds of leaves.
An owl does not come out in the daytime.
Apple peddler has only half a mustache.

PUZZLE NO. 5

Electric lights burning in daytime.
Automobile parked on wrong side of the street.
Automobile wheels are not alike.
Wrong end of canoe is tipped up.
Man's newspaper is upside down.
Sun casts shadow in opposite directions.
Tree has two different kinds of leaves.
Man's pants legs do not match.
Boy is standing on grass where sign says "keep off."

Tree is growing out of the water.
Chickens do not swim.
Pigeons do not perch in bushes.
Men are loafing where sign says "no loafing."
Word "hear" misspelled on sign.
Tree trunks are thinner near the ground than where they branch.
Cat has wrong kind of tail.

PUZZLE NO. 6

Word "Cigarettes" is misspelled.
Word "Tobacco" is misspelled.
Steps on pole upside down.
One of horse's hoofs is wrong.
Horse and wagon on wrong side of street.
Reins are missing from the horse's harness.
Traffic officer has his hand up with wrong signal.
Pumpkins do not have leaves like shown in wagon.
Man in foreground has his coat on backwards.
Bow on man's hat band on wrong side.
Man in foreground has only four fingers.
Flags waving in opposite directions.
Girl's stockings and shoes don't match.
Wrong kind of tail on dog.
Rear wheel on bicycle too large.

PUZZLE NO. 7

Sign "No Trespassing" misspelled.
6 x 9 is 54 instead of 45.
Wrong number of stripes in flag.
A dog cannot climb a lamp post.
A dog does not meow.
A cat does not bark.
Word "Matron" misspelled.
The heavy boy is on the wrong end of the board on seesaw.
Word "Allowed" misspelled on sign.
Man is reading newspaper upside down.
Bats do not fly in the daytime.
The larger wing of airplane should be on top.
Man's pipe is upside down.
Wrong end of flag fastened to pole.
The flag and the smoke are blowing in opposite directions.
Handle of ax upside down.
One of the swing ropes is missing.

PUZZLE NO. 8

Words "dog's," "cat's" and "allowed" incorrect on sign.
One handle missing from wash boiler.
Word "cigarettes" misspelled.
Potatoes are not sold by the quart.
Word "Cider" misspelled.
Dog should not be in grocery.
Dollar sign not in correct place on shoes.
Shoes are not mates.
Pear sign is not on pears.
Bananas growing upside down on stalk.
Mice do not come out where they are people.
Man has his hat on crosswise.
Ducks are not kept on the shelves in a grocery.
Wheels do not match on small boy's wagon.
Small boy has nothing by which to pull his wagon.
Numbers on the clock are backwards.

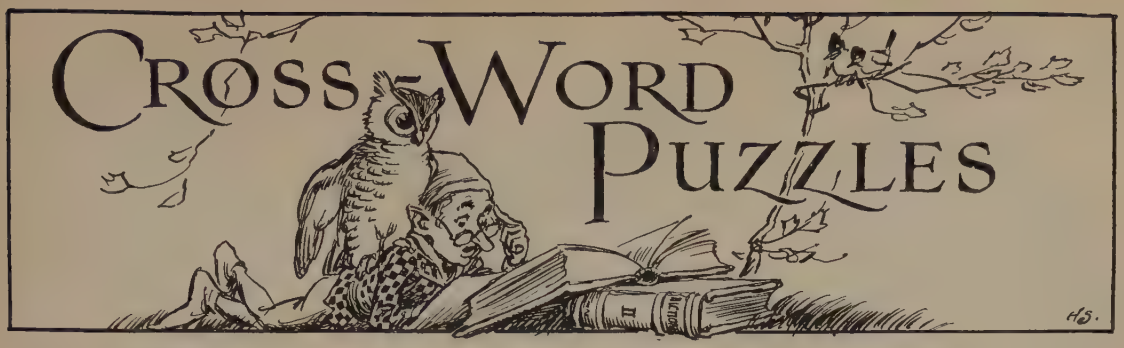
PUZZLE NO. 9

Man eating sundae with fork.
Word "Sundae" misspelled on sign.
Lenses in man's eye glasses do not match.
Word "here" misspelled on sign.
Cashier's cage has no window.
Electric light wire between fan blades.
Clock has only one hand.
Sign on counter faces wrong way.
Man has cap on backwards.
One soda cup has two handles.
Little girl's shoes do not match.
Man has only one spat on.
"Druggist" sign should be reversed on window.

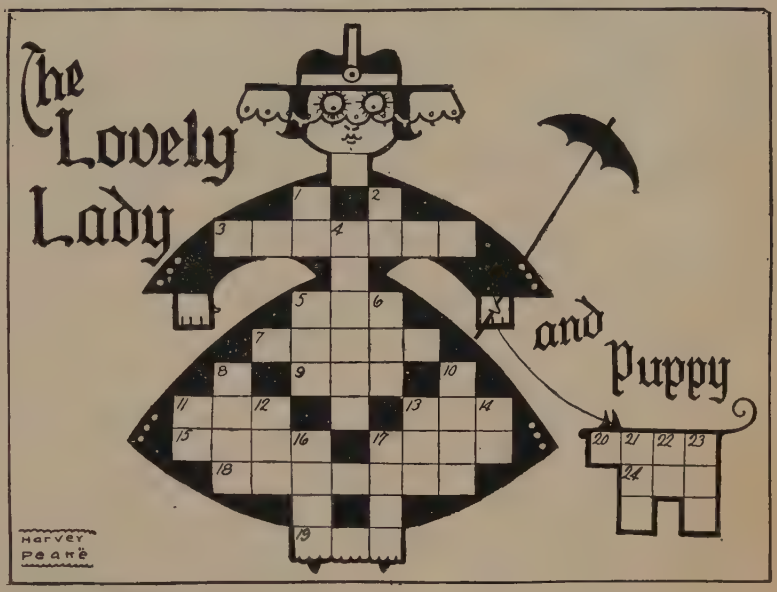
PUZZLE NO. 10

Giraffes do not have beards.
Giraffes are spotted instead of striped.
Stripes are running in wrong direction on zebra.
Eagle's cage has no top.
Wrong kind of trunk on palm tree.
Rhinoceros in hippopotamus' cage.
Word "Hippopotamus" spelled wrong.
Rhinoceros has wrong kind of feet.
Pheasants in pelican's cage.
Word "lion" misspelled.
Lions do not have striped coats.
Ibex should not be in glass cage.
Walrus in cage marked "seal."
Word "wolfs" should be "wolves."
Monkeys in cage marked "gorilla."
Snakes are not kept in open cages.
Ear on man in background is backwards.
Lady's hair is dark on one side and light on the other.

CROSS-WORD PUZZLES



The Lovely Lady and Puppy



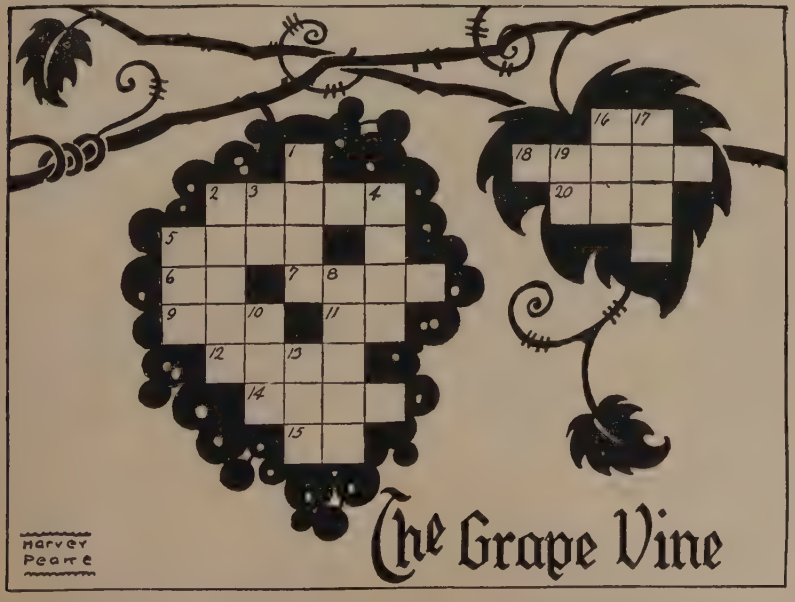
DOWN

1—Either.
2—To have existence.
4—To walk with a high stepping motion.
5—A fur or feather scarf for the neck.
6—To obtain.
8—A wise old man.
10—The fiery planet.
11—The second note in the scale.
12—A black, sticky substance.
13—Unhappy.
14—Initials for Post Script.
16—To pull or draw along by force.
17—The finish (plural).
21—Market value.
22—Initials for East River.
23—Nickname for Edward.

ACROSS

3—A snake.
5—A sack, pouch or wallet.
7—The things of which the human frame is made.
9—To become active.
11—A rodent.
13—The fluid of a tree.
15—An exclamation of pleasure.
17—The things by which we hear.
18—Messages or orders.
19—A fluid used for lighting or cooking.
20—Not closed.
24—To be.

The Grape Vine



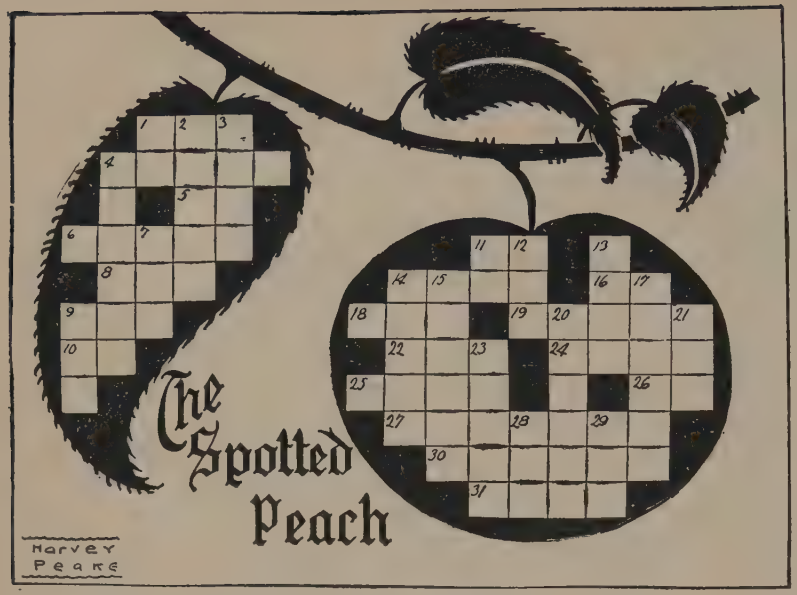
ACROSS

2—Excavations from which ores, coal, etc. are taken.
5—The place where money is manufactured.
6—Initials for Indian River.
7—Animals used in place of horses for drawing heavy loads.
9—Moisture found upon exposed surfaces in the morning.
11—A printer's measure.
12—A person who is beloved.
14—Trained or reared.
15—Abbreviation for manuscript.
16—What one tramp calls another.
18—What you do in order to learn.
20—The finish.

DOWN

1—Until (antiquated or scriptural form).
2—Stuck in the mud.
3—Into.
4—That which connects a fruit or flower to the main stalk.
5—Into the middle of a thing.
8—A kind of sherry.
10—The thing a spider weaves.
13—A part of the upper body.
16—A variety of baker's rolls.
17—Inequality or disadvantage.
19—Initials for Thomas Edison.

DO NOT WRITE IN THE BOOK; LAY A PIECE OF THIN PAPER OVER THE PUZZLES, AND TRACE THE SQUARES AND NUMBERS.



DOWN

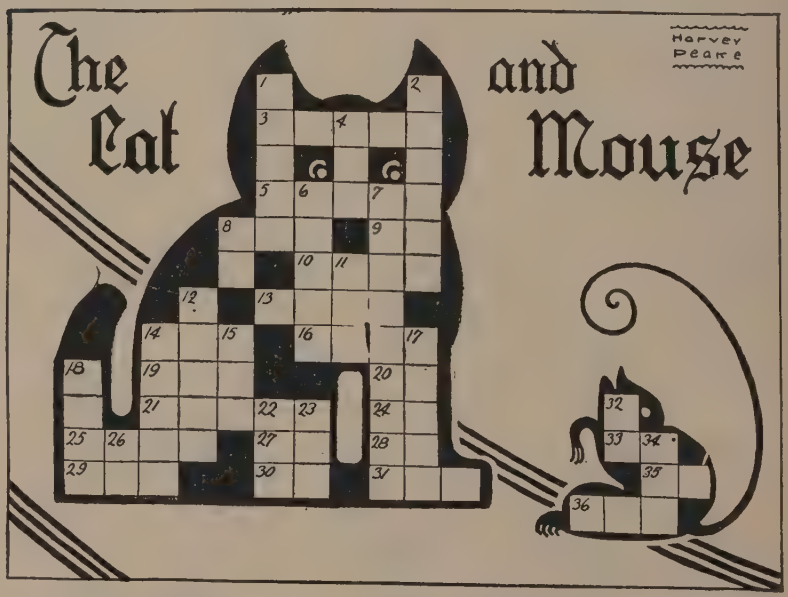
1—Preposition.
2—One who wanders.
3—Additional.
4—A sign.
7—Decay.
9—Not good.
11—Initials for United Republics.
12—A large body of salt water less in size than an ocean.
13—A cleansing in the water.
14—The queen of flowers (plural).
15—The god of male beauty.
17—The quality of being heavy.
20—A form of Russian government.
21—To steal.
23—To look at a thing for a long time.
28—Letters meaning By Way Of.
29—Initials for Student's Night School.

ACROSS

1—One of the upper limbs.
4—Past tense of stand.
5—Initials for Very Reverend.
6—To harmonize mentally, morally or physically.
8—Neither the other.
9—A winged animal of the rat variety.
10—Nickname for Albert.
11—We.
14—Unusual.
16—Initials for American Wares.
18—To jump along on one foot.
19—A fall flower.
22—A wireless call for help.
24—A midwestern state.
25—Part of a shoe between the upper and sole.
26—Initials for Great Britain.
27—In the manner of a slave.
30—That part of the world lying in the far East.
31—One who dines.

ACROSS

3—A term applied to the playing of outdoor games.
5—A slow movement in music.
8—Printer's measures.
9—Initials for Eastern Scotland.
10—A shade of color.
13—Dry and withered.
14—To have eaten.
16—Odd and unusual.
19—A term of respect used in addressing a man.
20—A tool for cutting down trees.
21—Any decree made by the Sultan of Turkey.
24—Initials for Lower Texas.
25—A movement of the head made by a drowsy person (plural).
27—A pair of letters put upon a thing to show that it is correct.
28—Initials meaning Lower Right.
29—A young deer.
30—Initials for North East.
31—A southern vegetable resembling a sweet potato.
33—From.
35—Like.
36—A head piece.



DOWN

1—One of the Songs of Solomon.
2—The very most.
4—A wooden tool used in propelling a boat.
6—A fall flower somewhat like a daisy.
7—Usually. In the majority of cases.
8—An abbreviation of Edward.
11—The name of a boy or man.
12—Giving something a whirling motion with a spoon (plural).
14—On or to one side.
15—A period of time.
17—Something that is added.
18—Fine powder of crushed rock.
22—To put on.
23—To extend or lengthen.
26—Initials for Opposite Opening.
32—The first note in the scale.
34—Fleshy.

DO NOT WRITE IN THE BOOK; LAY A PIECE OF THIN PAPER OVER THE PUZZLES, AND TRACE THE SQUARES AND NUMBERS.

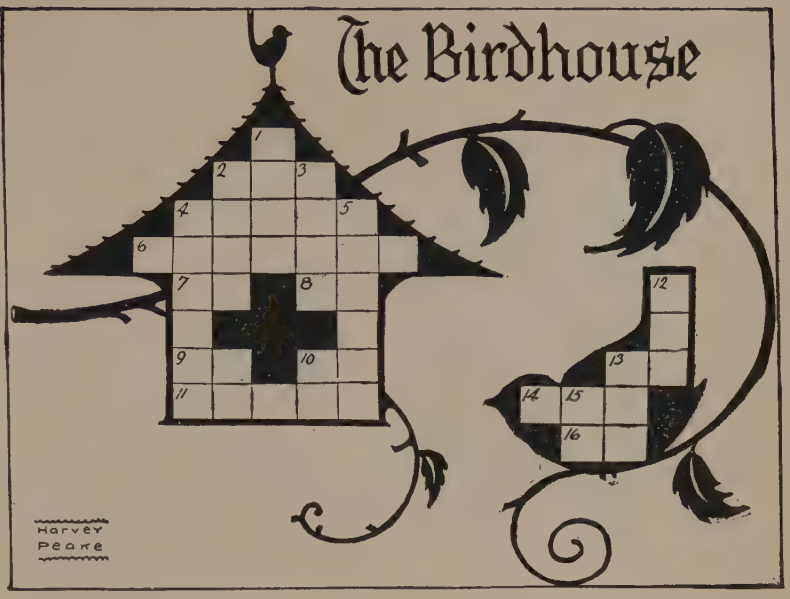
The Birdhouse

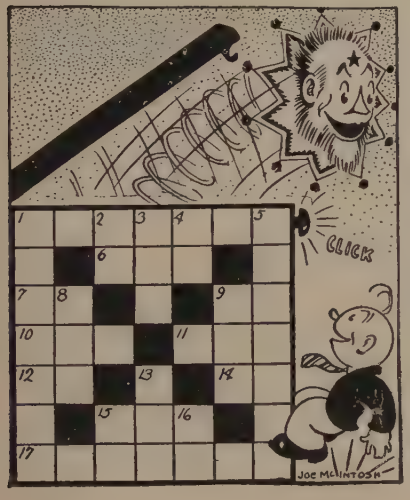
ACROSS

2—A rail or barrier.
4—Used for storing green fodder.
6—Not deep.
7—Old Soldiers (initials).
8—Land Reserves (initials).
9—Toward.
10—Old Estates (initials).
11—To pay out money.
13—Like.
14—A small insect.
16—Oldham, England (initials).

DOWN

1—To summon.
2—Cloth cut diagonally.
3—A baker's product (singular).
4—Loud calls or outcries.
5—Separated into grades or sizes.
12—Part of the verb "have."
13—To have consumed food.
15—The negative.





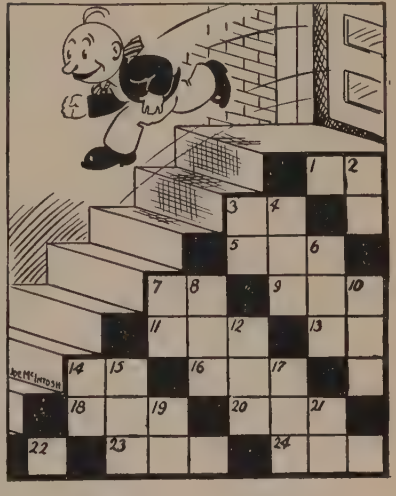
JACK-IN-BOX

ACROSS

1—A person ejected or cast out.
6—Not in.
7—Saint (abbr.).
9—Conjunction.
10—Strike lightly.
11—A hard wood.
12—A printers' measure.
14—Small New England State (abbr.).
15—Toward the stern.
17—Ungenerous.

DOWN

1—Popular sea food.
2—Towards.
3—Slash.
4—Near to or in.
5—Language of the Turks.
8—School girl's cap.
9—Part of rowboat.
13—Not on.
15—Prefix meaning wholly.
16—Stevenson's popular boys' story (initials).



STEPS

ACROSS

1—Thus.
3—Like manner.
5—To utter or express in words.
7—Halloo!
9—One more than nine.
11—Noah's vessel.
13—Provided that.
14—Nickname for Albert.
16—Snakelike fish.
18—Collection or series.
20—However.
23—Slang for sailor.
24—Summit.

DOWN

1—South (abbr.).
2—Conjunction.
3—Comparative adverb.
4—To have rested in a chair.
6—Affirmative.
7—Exclamation of mirth.
8—A mineral taken from the earth.
10—Adverb expressing denial.
12—Ledge of rocks near surface of water.
14—Artic Sea (initials).
15—Lower limb.
17—Allow or permit.
19—Toward.
21—Preposition.
22—Myself.

DO NOT WRITE IN THE BOOK; LAY A PIECE OF THIN PAPER OVER THE PUZZLES, AND TRACE THE SQUARES AND NUMBERS.

ACROSS

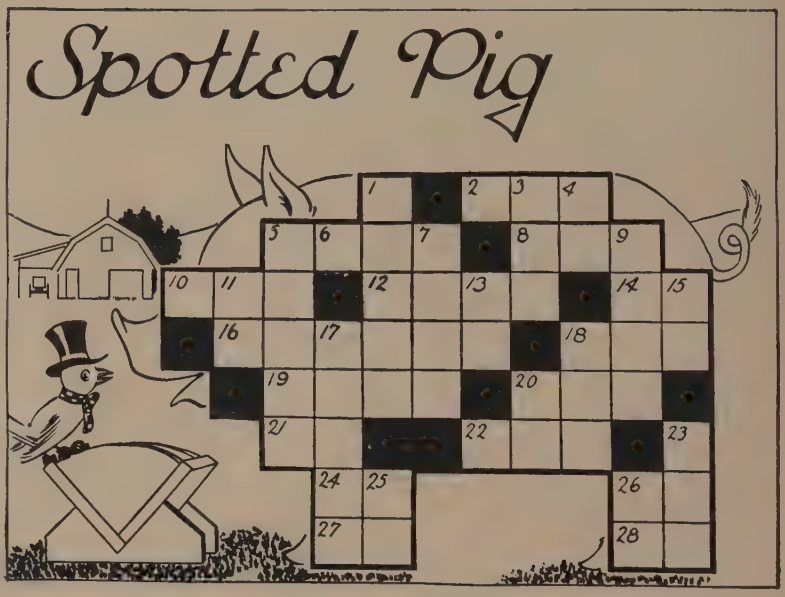
1—A negative.
3—Upon.
4—Members of a certain Indian tribe.
6—A boy's name.
9—Conjunction meaning either.
10—An irritating disease of the skin.
12—Initials for Illinois Central.
14—Elevated table land.
15—Has been.
17—Initials for Perfectly Right.
18—The sixth note in the scale.
19—Mine.

DOWN

1—In no way.
2—More than nothing and not as much as two.
4—To make use of.
5—The orb of day.
7—One who votes.
8—Parts of a circle.
10—A small and inferior devil.
11—Injury, hurt or damage.
12—Initials for Independent Worker.
13—Quiet and peaceful.
16—To speak.

DOWN

1—The fourth month.
2—The nineteenth letter.
3—The number of years one has lived.
4—More than one of us.
5—A Turkish soldier.
6—An adjective of one letter.
7—Where the sun rises.
9—Something that grows on a horse's neck.
10—Seventh letter of alphabet.
11—North Africa (initials).
13—Grant's Tomb (initials).
15—South East (abbr.).
17—Revolves.
18—Metal taken from the earth.
20—Location of world's greatest canal (abbr.).
23—To place in position.
24—Nova Scotia (abbr.).
25—Upon.
26—What some children call their mothers.

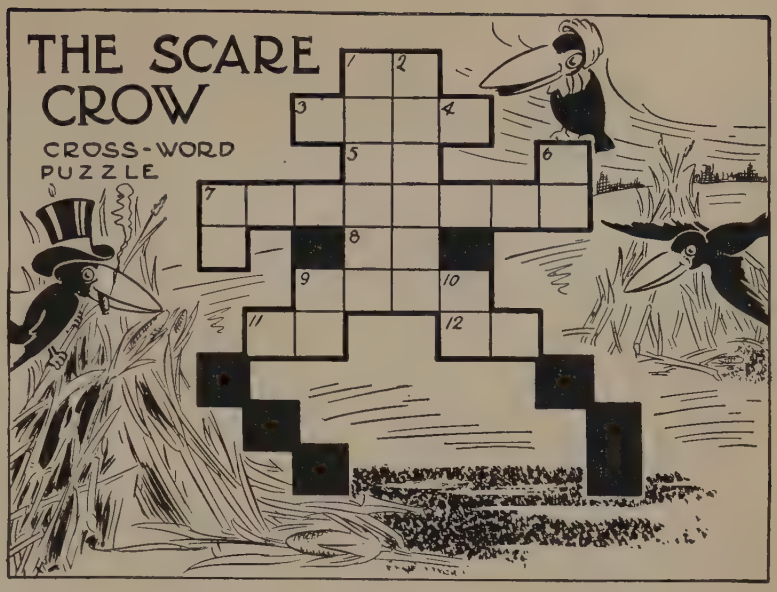


ACROSS

1—An adjective meaning one.
2—A tool for cutting wood.
5—Narrow bands of linen.
8—A precious stone.
10—An animal of the antelope family.
12—Anger.
14—To be like.
16—One who paints.
18—A single thing.
19—A religious belief.
20—Wrath.
21—A conjunction.
22—One of the monkey family.
24—Negative.
26—Myself.
27—Initials for Southern Nebraska.
28—Preposition.

DO NOT WRITE IN THE BOOK; LAY A PIECE OF THIN PAPER OVER THE PUZZLES, AND TRACE THE SQUARES AND NUMBERS.

THE SCARE CROW CROSS-WORD PUZZLE



ACROSS

1—The third and twelfth letters of the alphabet.
3—Not fat.
5—Place of the seal.
7—One who makes you buy.
8—Abbreviation for New England state.
9—Used for seeing.
11—Implement used by a lumberman.
12—A term applied to a person who thinks he is important.

DOWN

1—A crisp vegetable grown in sand.
2—Scotch name for girl.
3—Twelfth letter of the alphabet.
4—A direction (abbr.).
6—Not out.
7—Abbreviation for steamship.
9—Prefix applied to a former President.
10—The seventh note of the scale.

Ye Old Wind Mill

DOWN

1—A woman's voice in a low key.
2—To halt.
6—Initials for Parcel Post.
7—Egyptian sun god.
8—Initials for Indianapolis, Indiana.
9—Title applied to the medical profession.
10—I, myself.
11—We.
12—Initials for Lovers' Paradise.
13—Initials for Ever Young.
15—A long period of time.
16—To tear asunder.
18—4,840 square yards of land.
19—A term of endearment.
22—Possessing vigor.
23—A girl's name.
25—Frozen water.
26—Poetic form for open.
27—Part of a fishing outfit.
28—An upper limb.
30—Initials for American Reader.
31—Abbreviation for a small New England state.
33—Abbreviation for Doctor.
34—Initials for One Unit.

ACROSS

1—Like unto.
3—Initials for Lost Time.
4—Toward.
5—Initials for Open Promptly.
6—To pretend to be very nice.
10—A long-eared animal used for rough hauling.
14—Settled in full.
15—A halting form of speech.
17—To spy from a distance.
18—Barren.
20—A point of land jutting into the sea.
21—Always.
24—Initials for Independent Voter.
26—Name of a Persian Poet.
29—To find fault.
32—A scent.
35—The name of one of the great lakes.
36—A musical instrument beaten with padded sticks.

DO NOT WRITE IN THE BOOK; LAY A PIECE OF THIN PAPER OVER THE PUZZLES, AND TRACE THE SQUARES AND NUMBERS.

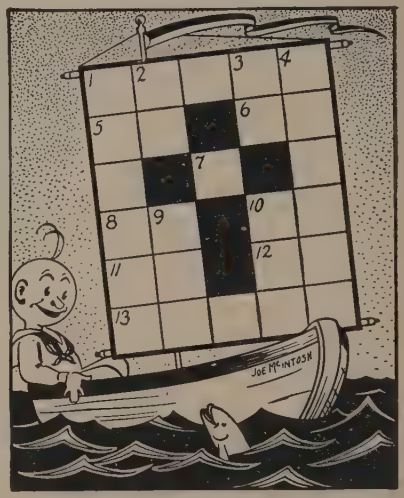
THE BOOK

ACROSS

1—Girl's name.
4—Girl's name pronounced like a boy's.
7—The act or state of knowing.
9—Epoch or age.
10—A canine.
11—Exclamation of surprise.
12—Opposite of right (abbr.).
13—Used to produce artificial currents of air.
15—To have consumed food.
16—To forsake or disappoint.
17—Twelve inches.

DOWN

1—A single thing.
2—Likewise not.
3—At or to a distance.
4—Common name for Bolsheviks.
5—Unnecessary activity or fuss.
6—Article of food we get from hens.
7—Eleventh letter of alphabet.
8—Initial of largest city in world.
11—Not on.
12—Lease or rent.
14—Automobile Association (initials).
15—Atlantic Ocean (initials).



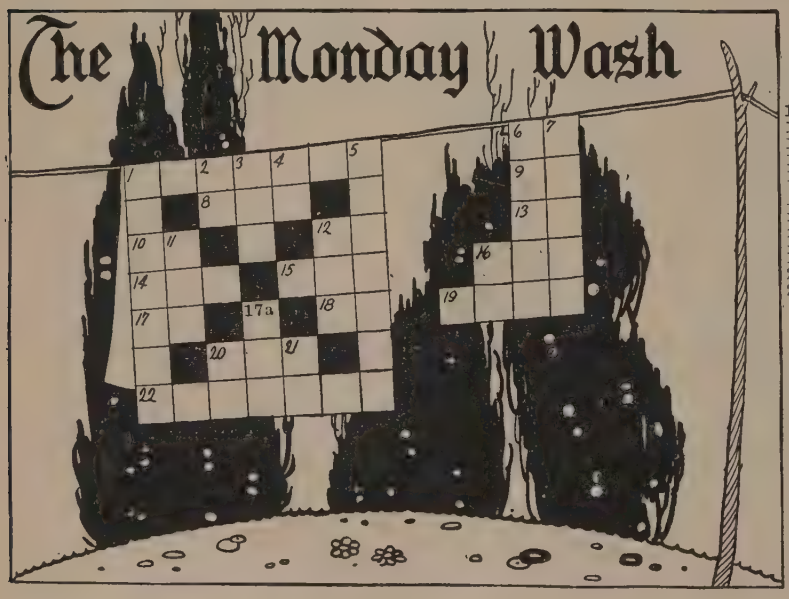
SAILBOAT

ACROSS

1—A brush for sweeping.
5—A note of the scale.
6—A southern state in the U. S. (abbr.).
7—Myself.
8—Preposition.
10—Within.
11—Prize fighter's term.
12—Syllable of word cedar.
13—Guide a boat.

DOWN

1—Shatters.
2—Royal Engineers (initials).
3—Fifteenth and twelfth letters.
4—Mien.
9—Small child.
10—Frozen water.



ACROSS

1—A daylight theatrical performance.
6—An exclamation of joy.
8—The first figure.
9—From.
10—The second note in the scale.
12—To exist.
13—Initials for Rough Treatment.
14—To make an effort.
15—A vegetable resembling a sweet potato.
16—To make use of.
17—Biblical form of you.
18—Initials for Deadly Enemies.
19—A large water pitcher.
20—In what manner?
22—To be suspicious.

DOWN

1—Those who give their lives for a cause.
2—Toward.
3—A country hotel.
4—Initials for Near East.
5—The basic principle of a thing.
6—What we used to depend upon before we had automobiles.
7—Later.
11—Before (poetical).
12—Evil.
16—Initials for Union Workman.
17a—To leap.
20—Initials for Horse Show.
21—Us.

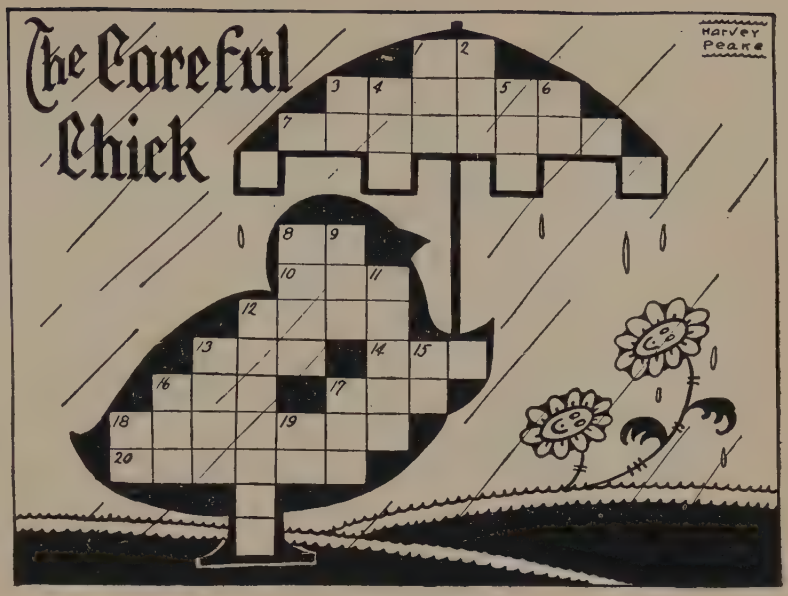
DO NOT WRITE IN THE BOOK; LAY A PIECE OF THIN PAPER OVER THE PUZZLES, AND TRACE THE SQUARES AND NUMBERS.

DOWN

1—A species of tall, graceful tree.
2—A silk neckpiece for man or woman.
3—Nickname for Albert.
4—To permit.
5—Final.
6—Initials for District Telegraph.
8—A flat piece of stone.
9—Another name for the sun.
11—Small and of little importance.
12—An outdoor fire of boxes and barrels.
13—A nickname for a simple fellow.
15—Either.
16—A title applied to gentlemen in Portugal or Brazil.
17—Initials for Arctic Regions Explored.
18—Initials for Community Entertainment.

ACROSS

1—Initials for Eastern Terminal.
3—United.
7—Earth, air, wind, fire, etc.
8—Initials for Sunday School.
10—To hang down.
12—A large bundle or package.
13—A sigh with tears.
14—The farthest from the bottom.
16—A great noise.
17—The fluid that surrounds the earth.
18—A state of quiet enjoyment.
20—A country ruled by an emperor.



ACROSS

1—A species of onion (plural).
5—A fabric of wool and hair.
6—A black substance from pine trees.
8—A swamp.
9—To make a noise like a dove.
11—To be.
12—By word of mouth.
14—The final word of a prayer.
15—The capital of Georgia.
16—Superb Yosemite (initials).
17—South Carolina (abbr.).
18—In like manner.
19—Abbreviation for a southwesterly direction.

DOWN

1—According to law.
2—First syllable of name of popular circus animal.
3—And so forth.
4—The part of the body that takes care of our food (plural).
5—One more than 39.
7—To have run.
8—To brag (plural).
10—A grain used for horse-feed.
13—Louisiana (abbr.).

DO NOT WRITE IN THE BOOK; LAY A PIECE OF THIN PAPER OVER THE PUZZLES, AND TRACE THE SQUARES AND NUMBERS.

ACROSS

1—Sixth letter of the alphabet.
2—A young deer.
4—Not stale.
6—An exclamation used in Scripture.
7—Going toward.
9—Established by usage or custom.
12—To be in debt.
13—One syllable of the word eking.
14—A nickname for Edward.
15—To muse or ponder.
19—Suffix used to form comparative degree.
20—Pain or suffering.

DOWN

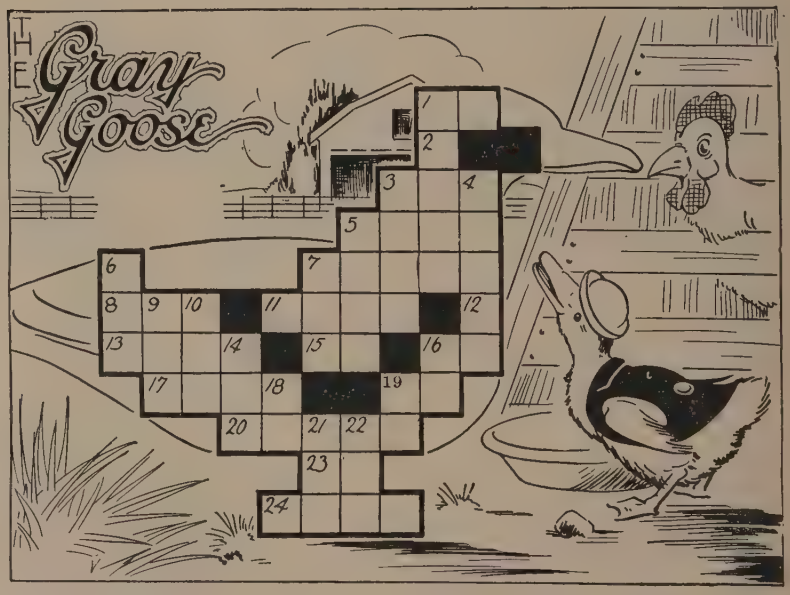
1—An enemy.
2—To have recited in a monotonous manner.
3—To set a high value upon.
4—A blossom.
5—Cry of wild geese (past tense).
8—Drugs obtained from the agalloch plant.
9—A hollow cake to hold ice cream.
10—The pupil of the eye.
11—Not far.
16—Women's auxiliary to Knights of Columbus (abbr.).
17—Timely Tips (initials).
18—Initials of America's greatest inventor.

ACROSS

1—To move forward.
2—Eighteenth letter of the alphabet.
3—An article upon which to wipe your feet.
5—The wooden rim of a window glass.
6—Fourth letter from the bottom of the alphabet.
7—A long-billed bird.
8—A term applied to painting and sculpture.
11—What grows on a sheep's back.
13—To appear to do something.
15—United Brethren (initials).
16—A male.
17—Clothing.
19—Western Oregon (initials).
20—To frighten.
23—Independent Order (initials).
24—A sign to the superstitious.

DOWN

1—To seize and hold.
3—A means of conveying letters.
4—In that place.
5—A vulgar upstart.
6—Has been.
7—A French coin of little value.
9—Regiment (abbr.).
10—A popular drink made of leaves.
14—Title of a married woman.
16—An exclamation meaning stop.



18—Before Christ (abbr.).
19—The two of us.
21—To direct at something.
22—A species of deer.

DO NOT WRITE IN THE BOOK; LAY A PIECE OF THIN PAPER OVER THE PUZZLES, AND TRACE THE SQUARES AND NUMBERS.

Down by the Sea

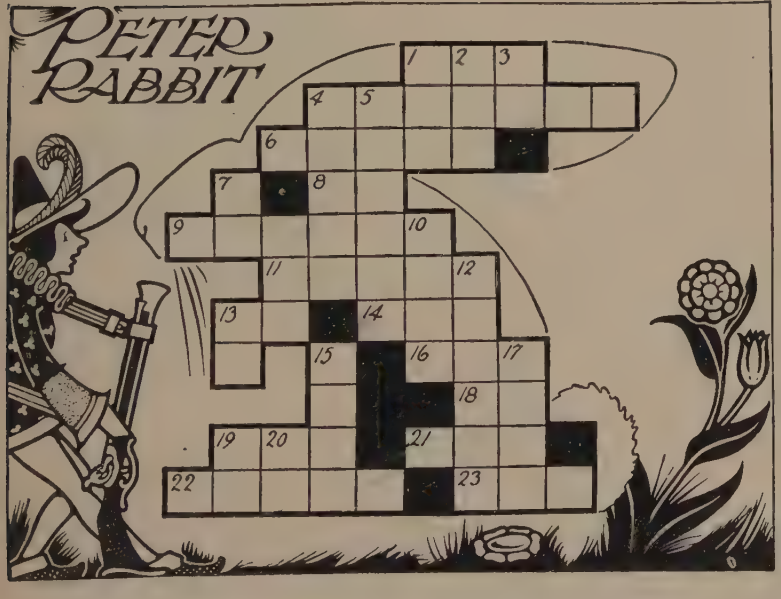
ACROSS

1—Initials for Orphan Annie.
3—A song of David.
7—Initials for Thomas Edison.
8—An exclamation.
9—From a lower to a higher position.
11—United States.
12—Initials for Profitable Alliance.
13—To be.
15—Initials for Indian Art.
16—That part of the world between the tropic of Cancer and the tropic of Capricorn.
19—Past tense of do.
21—That which clears up or explains.
22—To make use of.
23—A crowd of disorderly people.
26—That which is absolutely right.

DOWN

1—A poetic use of the word open.
2—Like.
4—Initials for Left Hand.
5—A swamp.
6—A vessel for drinking.
7—Evidences of sorrow dropping from the eyes.
10—The capital of France.
14—The sound made by a cow.
15—Frozen water.
17—Initials for Play Lively.
18—Initials for Irritating Voters.
19—To have made an excavation in the ground.
22—Initials for Dreadful Effects.
23—Abbreviation for Mister.
24—Either.
25—To exist.

Peter Rabbit



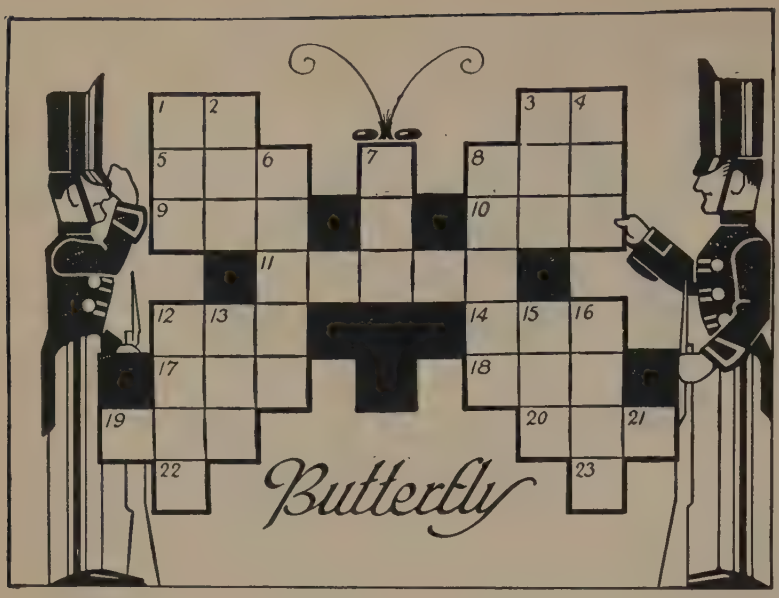
ACROSS

1—The whole.
4—A storm with spiral winds.
6—To shed blood.
8—The fifteenth and twelfth letters of the alphabet.
9—To cuddle up.
11—A daily task.
13—Belongs to me.
14—Gained.
16—A man who is always drunk.
18—United Republic (initials).
19—Iniquity.
21—The years of our life.
22—Curves.
23—A female barnyard fowl.

DOWN

1—A playing card with a single spot.
2—Doctor of laws (abbr.).
3—Biblical exclamation.
4—A woven fabric.
5—The color of gold.
7—I, myself.
10—The god of love.
12—Sufficient.
13—Maine (abbr.).
15—To repair.
17—The largest plant.
19—South East (abbr.).
20—Not out.

DO NOT WRITE IN THE BOOK; LAY A PIECE OF THIN PAPER OVER THE PUZZLES, AND TRACE THE SQUARES AND NUMBERS.



ACROSS

1—Initials for United Colonies.
3—The sixth note of a scale (musical).
5—Was seated.
8—A small pointed wooden pin.
9—A period of years.
10—To have eaten.
11—The material upon which this puzzle is printed.
12—A female.
14—A drink made of leaves.
17—The fluid we breathe.
18—A vegetable similar to the potato.
19—A North American tree.
20—A very small child.
22—The twentieth letter of the alphabet.
23—The nineteenth letter of the alphabet.

DOWN

1—To make use of.
2—The machine you ride in.
3—To permit.
4—The number of years you have lived.
6—A small wax candle.
7—To strike lightly.
8—An enjoyable social event.
12—A white substance used for seasoning.
13—A male.
15—To feed.
16—A boy's name.
19—Abbreviation for east.
21—The twentieth letter of the alphabet.

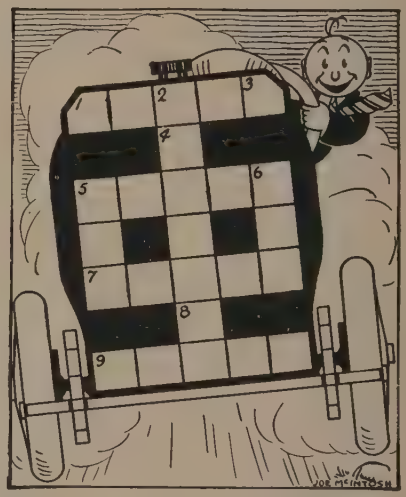
AUTO

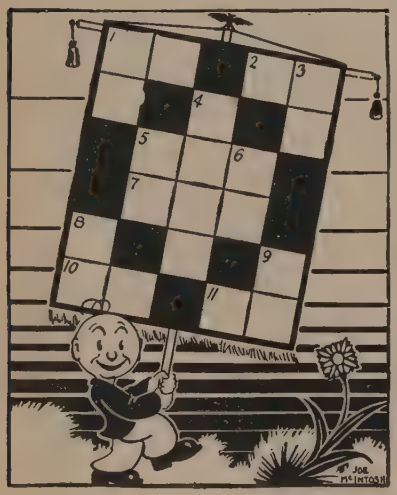
ACROSS

1—Acknowledge.
4—Article.
5—Contests of speed.
7—Sightless.
8—North (abbr.).
9—Well skilled.

DOWN

1—First letter of alphabet.
2—Automobile.
3—2,000 lbs. (abbr.).
5—Steal.
6—Turf.
9—America (abbr.).





THE BANNER

ACROSS

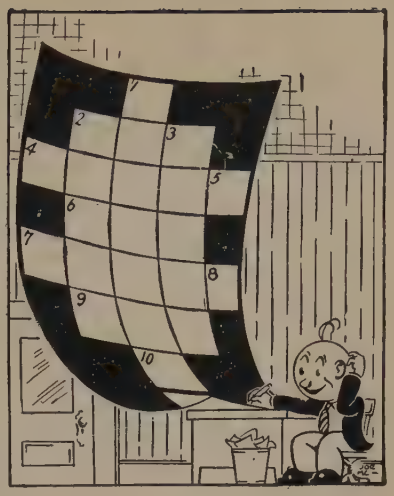
1—Preposition.
2—Conjunction.
4—A direction (abbr.).
5—A deep hole or abyss.
7—"A long time——."
8—A direction (abbr.).
9—The opposite direction.
10—Else.
11—Firm or Corporation (abbr.).

DOWN

1—Neuter pronoun.
2—Exclamation of surprise.
3—Second note of musical scale.
4—What the boy is carrying.
5—Father.
6—Toward.
8—Negative.
9—Thus.

DO NOT WRITE IN THE BOOK; LAY A PIECE OF THIN PAPER OVER THE PUZZLES, AND TRACE THE SQUARES AND NUMBERS.

THE PAPER

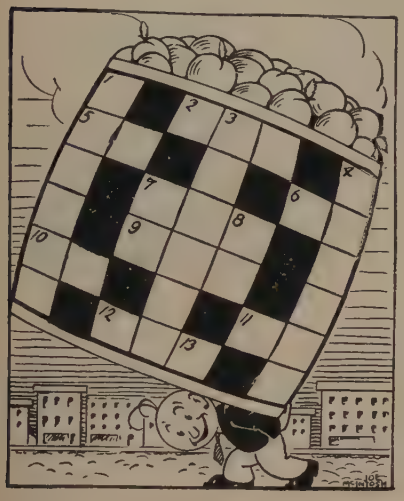


ACROSS

2—Painting, music, sculpture, etc.
4—Sing or hum in low monotonous voice.
6—A mischievous person.
7—Lift up.
9—Navy Ship Yards (initials).
10—England (initial).

DOWN

1—To agree to do or not to do.
2—Suffix used in forming words denoting occupation, age, sect, etc.
3—The imp of "Uncle Tom's Cabin."
4—A part of North America (initial).
5—North (abbr.).
7—Opposite of left (initial).
8—East (abbr.).



THE BARREL

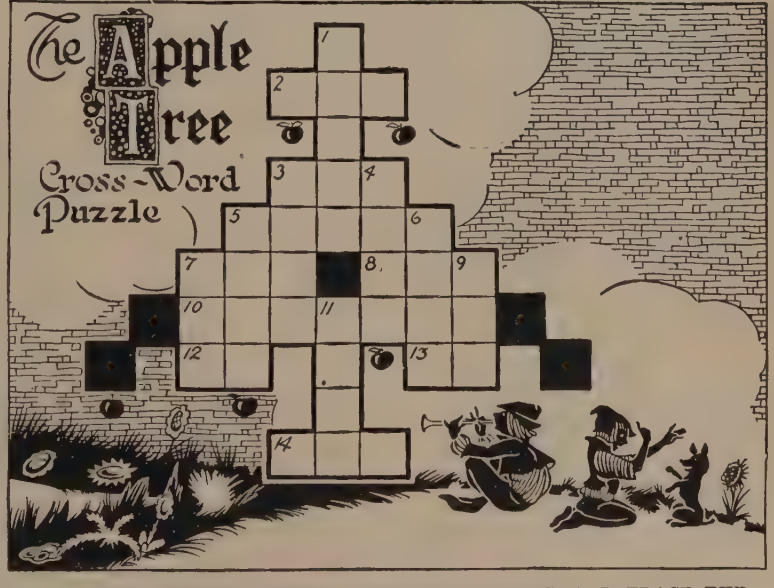
ACROSS

1—Second letter of alphabet.
2—Consume food.
4—A direction (abbr.).
5—Part of verb be.
6—Before Christ.
7—Chimpanzee.
9—Aged.
10—Nickname for Emma.
11—That is (abbr.).
12—Request.

DOWN

1—What the man has on his back.
2—A common fruit.
4—Frightened.
7—Atlantic Ocean (initials).
8—A boy's nickname.
11—Myself.
12—Shortest adverb.
13—Eleventh letter of alphabet.

The Apple Tree Cross-Word Puzzle



ACROSS

1—The second letter of the alphabet.
2—To shed tears.
3—A cutting tool for dressing timber.
5—To train or rear.
7—An Irishman's name.
8—A South American serpent.
10—A military attack.
12—Nova Scotia (initials).
13—Left entrance (initials).
14—To make use of.

DOWN

1—A newly wedded woman.
3—Painting, drawing, sculpture, etc.
4—An East Indian cow with humped back.
5—A kind of fish.
6—A plaything for girls.
7—A shallow tin vessel.
9—Having eaten.
11—The upper limbs of the body.

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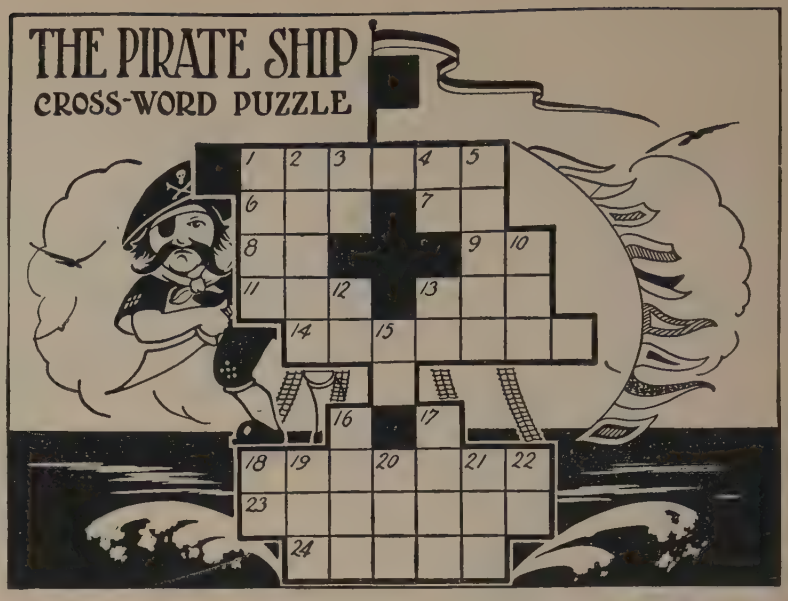
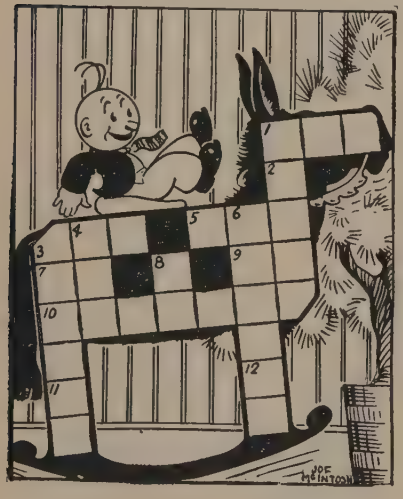
DOWN

1—Unable to speak.
2—To make amends for injury.
3—North East (abbr.).
4—Louisiana (abbr.)
5—To banish from one's country.
10—Advertisements (abbr.).
12—Dry Nation (initials).
13—Fifteenth and twelfth letters of alphabet.
15—To perform.
16—A Greek philosopher.
17—One way of spelling the name Amy.
18—To move forward.
19—A Jamaica liquor.
20—Modern Labor Device (initials).
21—Answers (abbr.).
22—Second note of the scale.

ACROSS

1—A cloak.
6—A tribe of Indians.
7—A sharp edged tool for hewing.
8—Toward.
9—Indian Archipelago (initials).
11—The last.
13—Not young.
14—Without end.
18—The study of a proper speech.
23—The line defining a figure.
24—Fashions.





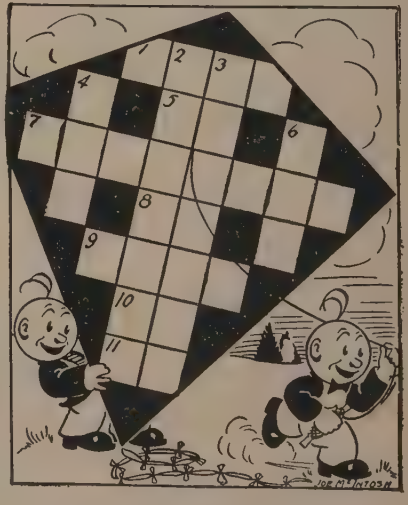
THE ROCKING-HORSE

ACROSS

1—A covering for the head.
2—An exclamation.
3—A rodent.
5—Child's dress protector.
7—Near to.
8—First letter of alphabet.
9—Pair of letters meaning take notice.
10—Attest.
11—North (abbr.).
12—Opposite of wrong (abbr.).

DOWN

1—Toy this represents.
3—A sport of horses.
4—To have taken food.
6—To tell.
8—Near to.



THE KITE

ACROSS

1—What the boys have.
4—Opposite of right (abbr.).
5—One of the continents (abbr.).
6—Myself.
7—Clattering.
8—Eastern Kansas (initials).
9—Small brown bird that sings sweetly.
10—National Reserves (initials).
11—Steamship (abbr.).

DOWN

2—Resident hosiptal doctors.
3—Those who converse.
4—The way kittens drink milk.
6—Writing fluid.
9—World (initial).

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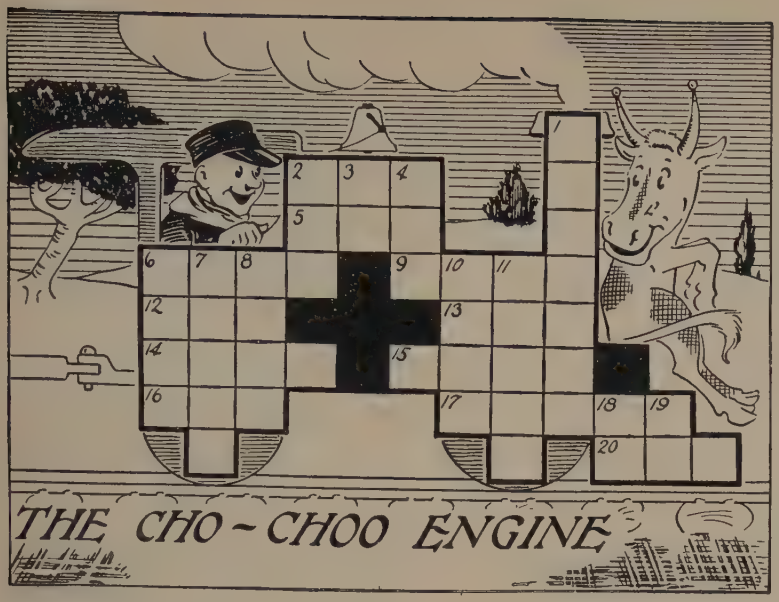


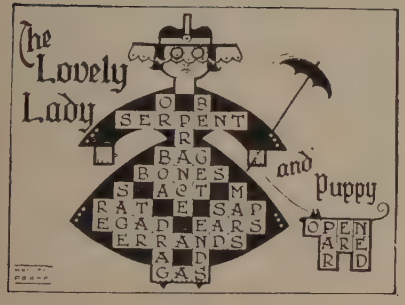
ACROSS

2—Modest and bashful.
5—Present tense, plural, of be.
6—A celestial body.
9—To make senseless by a blow.
12—The sun or moon.
13—A female character in The Fairy Queen.
14—Solid or liquid food.
15—A large Egyptian bird.
16—Name of a German composer.
17—Oils from roses.
20—An animal's retreat.

DOWN

1—One who is expert in athletics.
2—An automobile.
3—A conjunction.
4—Assent.
6—A hot-weather beverage.
7—Family, race or class.
8—To assist, or encourage a wrong-doer.
10—A large brass horn.
11—To bring together.
18—Anno Domini (abbr.).
19—Second note in the scale.

Answers to Cross-Word Puzzles

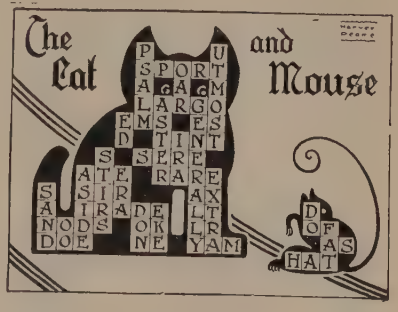


JACK-IN-BOX

Across
1—Outcast
6—Out
7—St.
9—Or
10—Tap
11—Oak
12—Em
14—R. I.
15—Aft
17—Selfish

Down

1—Oysters
2—To
3—Cut
4—At
5—Turkish
8—Tam
9—Oar
13—Off
15—Al
16—T. I.



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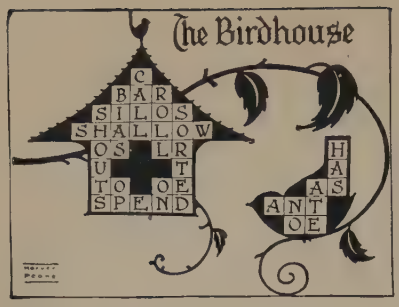


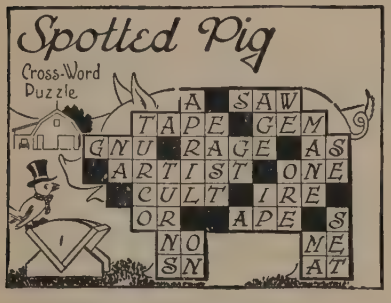
STEPS

Across

1—So
3—As
5—Say
7—Ho
9—Ten
11—Ark
13—So
14—Al
16—Eel
18—Set
20—Yet
23—Gob
24—Top

Down

1—S
2—Or
3—As
4—Sat
6—Yes
7—Ha
8—Ore
10—Not
12—Key
14—A. S.
15—Leg
17—Let
19—To
21—To
22—I



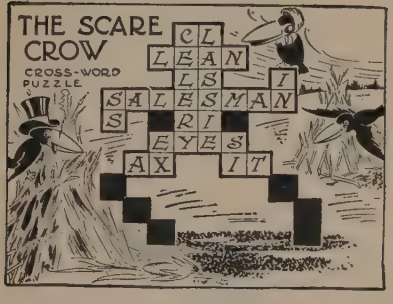
BOOK

Across

1—Ona
4—Rae
7—Knowledge
9—Era
10—Dog
11—O.
12—L.
13—Fan
15—Ate
16—Fail
17—Foot

Down

1—One
2—Nor
3—Away
4—Reds
5—Ado
6—Egg
7—K.
8—L.
11—Off
12—Let
14—A. A.
15—A. O.



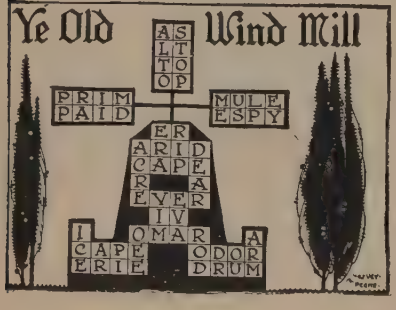
SAILBOAT

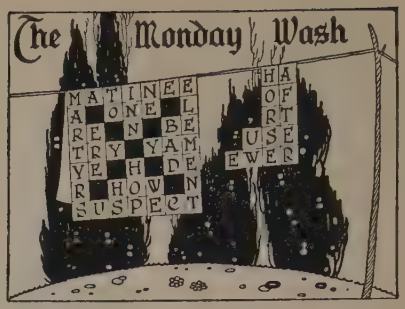
Across

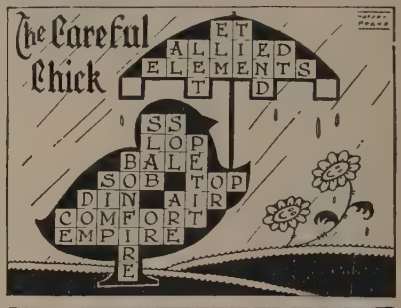
1—Broom
5—Re
6—La
7—I
8—At
10—In
11—K. O.
12—Ce
13—Steer

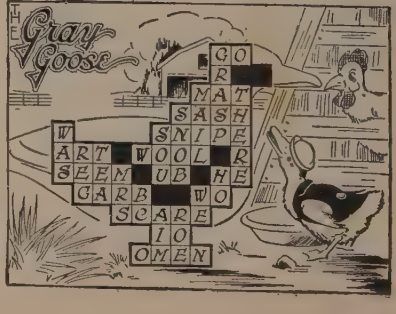
Down

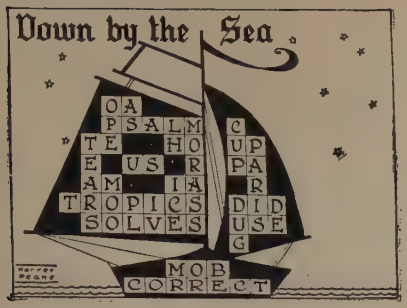
1—Breaks
2—R. E.
3—O. L.
4—Manner
9—Tot
10—Ice











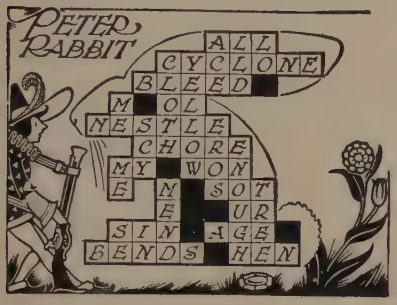
AUTO

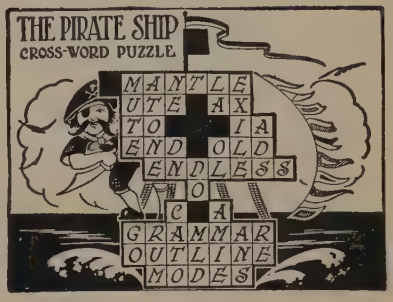
Across

1—Admit
4—A
5—Races
7—Blind
8—N
9—Adept

Down

1—A
2—Machine
3—T
5—Rob
6—Sod
9—A





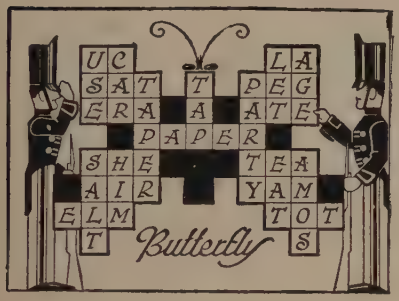
BANNER

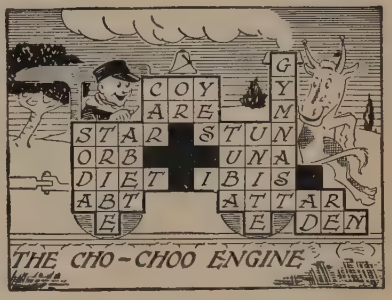
Across

1—In
2—Or
4—S.
5—Pit
7—Ago
8—N.
9—S.
10—Or
11—Co.

Down

1—It
2—O.
3—Re.
4—Sign
5—Pa.
6—To
8—No
9—So





PAPER

Across

2—Art
4—Croon
6—Imp
7—Raise
9—N. S. Y.
10—E.

Down

1—Promise
2—Arian
3—Topsy
4—C.
5—N.
7—R.
8—E.

BARREL

Across

1—B
2—Eat
4—S
5—Am
6—B. C.
7—Ape
9—Old
10—Em.
11—i. e.
12—Ask

Down

1—Barrel
2—Apples
4—Scared
7—A. O.
8—Ed.
11—I.
12—s
13—k

HORSE

Across

1—Hat
2—O
3—Rat
5—Bib
7—At
8—A
9—N. B.
10—Certify
11—N.
12—R.

Down

1—Hobby
3—Racing
4—Ate
6—Inform
8—At

KITE

Across

1—Kite
4—L.
5—N. A.
6—I
7—Rattling
8—E. K.
9—Wren
10—N. R.
11—SS.

Down

2—Interns
3—Talkers
4—Lap
6—Ink
9—W.

HANDWORK FOR THE HOLIDAYS

By Mrs. Bertha Payne Newell

THESE take a big place in the life of children, anticipated so long in advance that they are great incentives to preparation that can be continued for a period of days and even weeks. They are centers in themselves, full of meaning. Around them cluster tales, songs, games, and each calls for something to be made or arranged in which children can take part with zest.

Thanksgiving, Christmas, New Year, Easter, and the civic birthdays, Washington's, Lincoln's, Lee's, the Fourth of July, Memorial Day, are all of them occasions of meaning. Of course Christmas is for children The Great Day of the whole year, and its preparation, masked in secrecy and surprise, begins long in advance. Valentine's Day and Hallowe'en are the children's own, dedicated to merrymaking. May-day, once the day for young lovers in Merry England, is now the children's day exclusively.

We owe a debt to childhood for maintaining joy, poetry, and spring in a tense and weighted age. Let us pay it by preserving to them their holidays, each with its full, its best significance, its poetry and symbolism.

Family birthdays too can be celebrated with some special treat. Children can make small gifts, that will have enlisted their most careful work because it is for someone else. Clean hands and neatness seem essential when a present is marred by inattention to these matters.

Let us look at some things that can be made that will go into some of these celebrations.

HALLOWE'EN

This festival grew out of All Hallows' Eve, a religious festival. Nothing of its original meaning remains in this country, save the by-product of tricksy elf, witch, and ghost, probably a degeneration of the original belief that the spirits of the departed came to earth and communed with the living.

"How long is it to Hallowe'en, Mother?"

"Two weeks from to-night, my dear."

"Goody! only fourteen days more. Won't you ask Daddy to take us out in the country where we can get pumpkins and bring them home to make Jack-o'-lanterns?"

"What's that about Jack-o'-lanterns?" says Father, coming into the room at that moment.

"No pumpkins to play with this year, food is too scarce to waste on playthings."

"Oh, Daddy, please; just one pumpkin?"

"Not one, my dear. It wouldn't be right."

"Never mind," says Mother. "There are a lot of cereal boxes I have been saving on the top pantry shelf. Perhaps you can make lanterns of them."

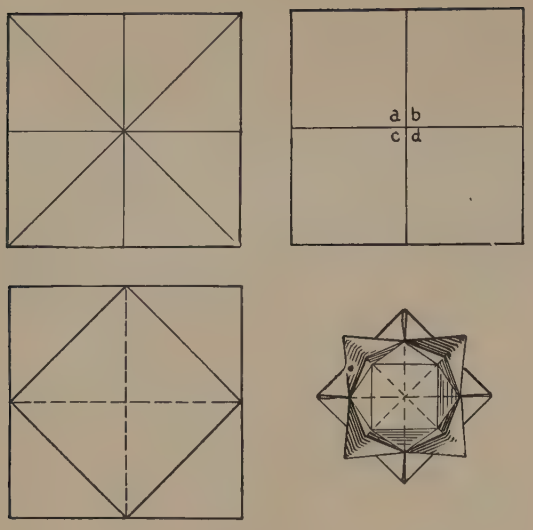
And the next time Mother came into the dining-room this is what she saw: A little girl hard at work drawing nose, eyes, and mouth on the side of a cylindrical box of heavy pasteboard.

"Please, Mother, may I take your knife?"

"Don't you want me to do it?"

"No, please, I want to do it myself."

When it was cut out she found some black cats in a magazine which she traced on thin paper, colored with crayon, and pasted on for decoration. We stuck a large piece of candle in the bottom with a little melted paraffine. When it was lighted it glared in a pleasantly terrific way, and featured largely in the procession of small white-clad figures that larked about the neigh-



NUT DISH—I

borhood and wound up at our fireside, where they popped corn, ate apples, and told elf-tales.

"I believe I like my Jack-o'-lantern as well if it were a real pumpkin," was the final verdict, echoed by every child present.

THANKSGIVING DAY

The celebration of this day, with reminders of its origin in Puritan New England, is best left to the older children. For the little ones its significance is best understood as a harvest festival. The younger children can learn to make souvenirs for the dinner-table, little folded dishes for the salted nuts, and turtles of table-raisins, with cloves for legs, head, and tail. They can assist in the cooking operations, and best of all, can learn a thanksgiving hymn to be sung as grace before or after the feast.

Nut Dishes

Fold a square of paper in half diagonally both ways.

Fold each corner over to touch the center, making an envelope shape.

Turn paper the other side up, and repeat last folds, making a smaller envelope.

Turn paper over and note four small squares. Tuck back the corners that meet in the center, each underneath the square of which it is a part, making four triangles.

Turn paper over again; the other side shows four *stiff* triangles which meet in the center. Fold these center corners back to outside corners of square. Press firmly.

Turn over on other side. Put a finger in the tiny triangular pocket, and with thumb and forefinger of other hand pinch it till it doubles in half. Repeat with other three, and you have a tiny dish that stands on four tiny triangular feet.

These might be used for saltcellars.

Or, take a six-inch square of paper and fold it in half diagonally. Fold this triangle in half again, and once again. Note the right angle. Fold it down to touch the middle of the opposite (the longest edge). Fold it back again. Note crease parallel with long edge. Cut the whole paper through on this crease.

Open and see cross with arms ending in triangles. Fold each of these triangles toward the center. Turn paper over and fold each square arm over the center square. Stand the paper on this center square with arms at right angles to it and triangular tips pointing out.

Punch holes at meeting of arms and tie.

Place-Cards

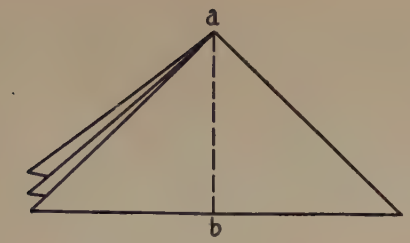
These might be made out of white cards with a little picture pasted at the left-hand end, such as would be appropriate to the day. You might draw a pumpkin on a card and let children color and cut it out and write names across it. A strip of stiff paper pasted to the back will make these stand up in easel fashion. A little Puritan maid, drawn in silhouette, alternating with a Puritan man in broad-brimmed hat and full knee-breeches, would make good place-cards or souvenirs.

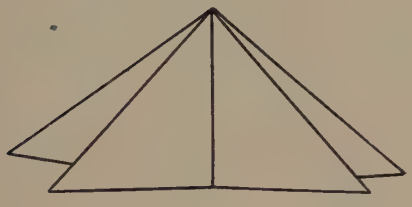
CHRISTMAS

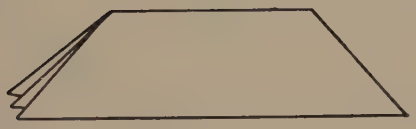
This climax of all holidays, anticipated the long year through, is a day for giving by even the youngest. I used to notice in the kindergarten that the children were wholly absorbed in making and giving, without a single thought of receiving a gift at the kindergarten Christmas tree. They each made two articles, one for Father and one for Mother. The moment grew tense when the time for stripping the tree came. The taking of the gifts from the teacher and marching proudly with them to the smiling father or mother (one could seldom hope to achieve the presence of both) was a crisis, a triumph rehearsed in imagination many times in the foregoing weeks.

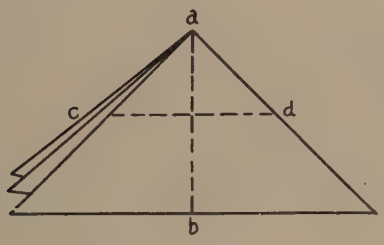
We made a trip to the country this year and cut down our own tree. It was the prettiest one we ever had. Helen fancied all the folks who saw our Ford thus burdened envied our fortune.

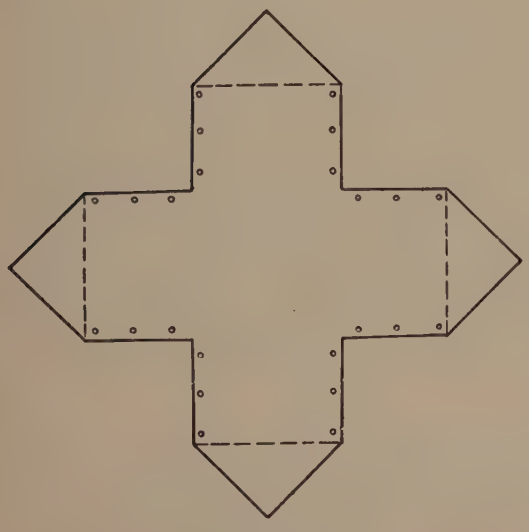
Mother made a trip to the store and announced there was not a bit of tinsel to be had for trimming.











NUT DISH—II

"Never mind," said Helen. "We can make our own trimming.

So we got out the box of all kinds of bright paper, and this is what we made.

Lanterns

Take a square of bright-colored paper.

Measure one-half an inch from each corner on each edge.

Connect these dots with lines.

Dot the lines on two opposite edges about one-quarter of an inch apart.

Fold paper in half to bisect these lines. Cut in lines.

The result is a "mat" such as we made for weaving.

Bring edges of mat together so edges lap and paste. Parallel strips must run up and down.

Attach paper strip for handle.

Cornucopias

Lap two adjacent edges of a square of paper and paste.

Attach handle.

If these are made of bristol-board or cover-paper, or of woven paper mats lined with these papers, they will be strong enough to use for candy and nuts. Otherwise they will be merely decorative.

Bells

Make exactly like cornucopia, but paste a little clapper to one edge and tie a string at the point to hang it by. These should be quite small and are a very gay trimming.

Candles

Roll a square of paper, beginning with one edge, into a cylinder.

Paste securely. A flame-shaped piece of gilt or yellow paper pasted to the top makes it more realistic.

Cut a notch in the bottom. Place over a twig and pin, pasting pin through or under twig.

Star

Take a six-inch square of paper and fold in half to make an oblong. Place ruler along short edge at left hand, even with long edge.

Place dots one inch and two inches from corner. (See Fig. 1.)

Fold corner d over to dot 2. (See Fig. 2.)

Fold corner e over as far as it will go. (See Fig. 3.)

Fold edge x—y over to 2—y.

Cut line 2—e. (See Fig. 4.)

These may be cut from gilt paper, two thicknesses pasted together, with a black thread put between to hang it by.

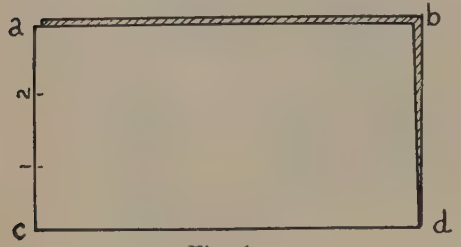


Fig. 1

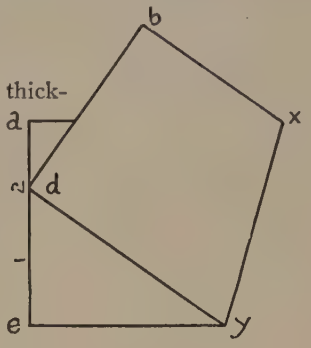


Fig. 2

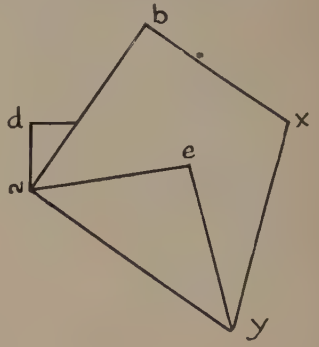


Fig. 3

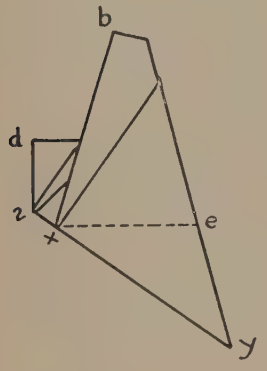


Fig. 4

HOW TO MAKE THE STAR

With these decorations, and chains of red and gold rings, our tree was prettier than any we ever had.

CHRISTMAS PRESENTS

Kindergarten sewing on fine perforations is under the ban because of the strain on eyes. But there are large cards with punched-out holes far apart that can be quickly and easily sewed with colored cotton or zephyr by darning needles, that are delightful to do and in moderation harmless. These can be had of the kindergarten supply-houses. If you use them get the simplest outlines and never let a child sew more than twenty minutes in one period.

Penwiper

Circular card, maple or ivy-leaf design. Sew round outline once in and out, then round again to fill gaps.

Lay card down on old white cotton cloth and mark around with soft pencil, and cut out several thicknesses.

Attach to card by stitches through the center.

Needle-Book

Similar to above. Cut flannel leaves. Attach to edge of card.

Match-Scratcher

Sew any simple design on oblong or square card. Glue sandpaper to back. Punch holes in top and tie ribbon-hanger in.

Calendars

These can be made by cutting out small pictures appropriate to Christmas and pasting them on a card with a small calendar below. The school supply-houses carry a line of these small pictures.

The beauty of these depends on the neatness of the pasting, the color of card and ribbon or cord used to hang it, and the spacing of picture and calendar, width of margins, etc. These are matters for the mother to call to the children's attention before pasting. Let them experiment with the arrangement, and then put pencil-marks on the card to mark corners of picture.

Pintrays

Very small picnic plates can be bought for a few cents a dozen, for children to decorate with a band of color done in water-color about the rim. Pictures can be used for the center.

Blotters

Get a sheet of blotting-paper and narrow ribbon to harmonize. Lay on it a stiff blotter of size desired and let child mark round it and cut out with scissors. Tie several of these

PENWIPER

together with ribbon run through slits or holes punched through the several blotters. A picture may be pasted on the top one.

A Ball for the Baby

Cut circle two inches in diameter from a piece of card. Punch out a hole one-fourth inch in diameter at center. Thread darning needle with long, double strand of wool. Sew through hole, bring over edge of card and in hole again. Repeat until hole is full and circle thickly padded. Cut along edge of circle. Push wool back and, separating the two round pieces of cardboard, introduce a string between them and tie it firmly around wool at center of circle. Tear card away and trim ends of wool off to a well-shaped ball. Of course many strands will have to be threaded into needle.

Address or Note-Book

Cut square of cover-paper 5 x 5 inches.

Stamp a small design in each corner, or along each edge.

Fold into oblong.

Cut several leaves slightly smaller. Fold and sew, pin, or fasten with paper fasteners into the decorated cover.

Burnt-Match Holder

Punch two holes with a sharp pointed nail in the edge of a baking-powder can, opposite each other.

Cut a rectangle of paper as wide as the height of can and long enough to wrap round and overlap it.

Decorate along top and bottom edges and glue around can.

Punch holes to match those in can, and pass ribbon through for hanging.

Tray for Bureau

Take a square of water-color or cover-paper 8 x 8 inches.

With ruler find and mark points two inches from corners on each edge.

Using ruler as guide, connect opposite dots.

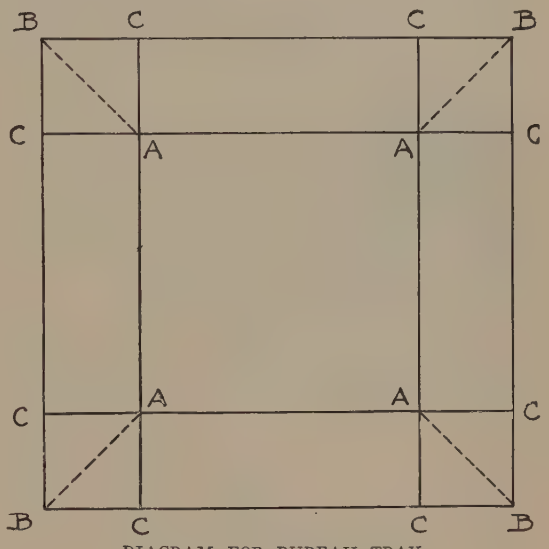


DIAGRAM FOR BUREAU TRAY

Draw lines from each intersecting point of these lines to corner nearest.

Cut on this last line.

Place ruler on one of the lines that outline square and score lightly with knife-point, and repeat on other lines.

Bend edges of paper up.

Let triangular ends of these edges overlap, punch holes in each pair and tie with ribbon.

Decoration may be printed on rim before tying.

THE EASIEST THINGS IN RAFFIA

This material, much used in basketry, is too hard for children of this age to weave, but there are many things to be made by winding, a few of which are described below.

Picture-Frame

For this a circle-marker will be needed.

Cut a circle five inches in diameter.

Within this draw and cut a circle three inches in diameter.

Wrap the resulting one-inch circular band with raffia.

Cut another pasteboard circle slightly smaller, and glue to back of first, leaving opening at top through which picture may be slipped.

Punch holes with bodkin and pass ribbon-hanger through and tie.

Napkin-Ring

For foundation use a circle of pasteboard from ½ to 1 inch wide. (This may be had from a ribbon bolt or cut from the end of a mailing tube.)

Wrap a strand of raffia once round, passing through center and tie. Continue wrapping until nearly at end of strand.

Lay end of new strand on ring and wrap old strand over it until it is firm, then begin wrapping with new strand, covering end of old strand firmly. Proceed in this way to end.

When ring is covered, weave end of last strand in and out on inner surface of ring.

This may be decorated and made more secure by threading a narrow ribbon into a darning needle and darning in and out once around ring at middle and tying in bow.

If this method of lapping new over old strands does not seem practicable, the two strands may be tied in such a place that the knot will be on inside of ring.

Needle-Book

Wrap two disks as above and fasten two circles of flannel between them at margin and decorate with ribbon bow.

Trinket-Box

Wrap circular band as for napkin-ring.

Wrap two disks cut to fit ring for top and bottom of box.

Sew one all around for bottom, and attach other at margin for cover.

Doll's Broom

Take a little round stick for handle.

Cut raffia two inches long, lay a few on end of stick and wrap and tie with end of long strand. Continue placing short pieces and wrapping with long until broom is full enough, fasten end firmly.

In all this work children will need help in making the firm fastenings necessary until they have learned how to manage it for themselves.

Pen-Wiper

Cut circular disk of cardboard about three inches in diameter.

Cut hole in center about one-quarter inch in diameter.

Wrap, passing strand through center.

Cut two circles slightly smaller from an old kid glove or cotton cloth and fasten to center of disk.

ST. VALENTINE'S DAY

The accepted convention of our children was a lace-paper fantasy touched up with gilt and tiny bouquets, mounted on a folded sheet of paper, inscribed with a tender sentiment. No other form of valentine has seemed so resplendent, so prodigal in its promises of unlimited affection. The first plan offered below is fashioned after the old model.

Take a square of paper and fold in a triangle.

Fold sharp corners together, making a smaller triangle.

Repeat, folding one sharp corner over to the opposite on one side of paper and the other on the other side.

Cut from one short edge toward the long edge in a line parallel with opposite short edge of triangle. Repeat from long side and continue alternating, *never cutting paper clear through to* opposite side. It is best to draw lines to mark cuts.

Unfold carefully and pull up from center in "Bird-cage."

Mount this on a square of colored paper, and put verse on reverse side. Very pretty if done in thin white paper.

Another Lacy One

Fold as before and cut heart-shaped notches from the edges that are folded.

This is prettier if long edge is cut in curves first.

Open and mount on delicate tint of paper by tiny dabs of paste at corners.

Hearts

Fold square of paper in half and cut a heart from it. Practice until you have a satisfactorily proportioned pattern.

Lay this on a red paper, draw around it, and cut out.

Repeat on white paper, and tie two of these to back of red one, punching holes in "shoulders of hearts" for ribbons.

Paste pictures on all three, or, let child select verse for you to write on one.

Heart-Shaped Doors

Fold paper in half, open and fold two opposite edges to center crease, double in half on crease and cut heart, leaving paper united at widest part.

Open and write verse on inner face.

Pictures may decorate heart-shaped doors.

Graduated Hearts

Cut three hearts of graduated sizes and punch and tie the smaller below the larger. Decorate and inscribe.

EASTER

Colored eggs and rabbits, lilies and butterflies, these seem a curious combination of things to be associated in a child's mind with a church festival. And yet all save the rabbit do symbolize awakening life from seeming death. He is a survival of an old German tale explaining in fanciful terms the origin of the colored eggs. The story is a good one to tell children of this age.

Hand Work for Easter

Outline on cards very simply such flowers as the tulip, jonquil, and narcissus, and let children tint them in water-color. If these blossoms have opened in your own house, the children will be familiar enough with them to paint them free-hand, and after a little daily practice of this sort can put the picture on a card. Even though crude, it will be all their own work. Outline pictures for sewing can be ordered from the kindergarten supply-houses.

Butterflies will be found in color in the Nature and Outdoor Life section of this set, that will make splendid copy for the children to draw by tracing through on thin paper and coloring in crayon or paint. After a good deal of "choosing" one will be found that can be cut out of the tracing paper and attached with tiny dabs of paste to a card.

Some of the cards may be decorated with edges of the water-color gilt, to be had for very little at drug stores and stationers.

In addition to these gifts, there are nests and clay eggs to be modeled and hidden in the garden for other children to find. The eggs should be thoroughly dried in the room, then in the oven, and tinted with thick water-color or calcimine.

Let them make nests of dry grass, twigs, string and paper, in imitation of the birds' nests they found last fall, and hide them in fence corners, bushes, and other nooks. If you live in the city and have no yard, take them to a quiet corner of the park, inviting other children to the hunt.

When you have developed a good butterfly pattern from studying the pictures, fold it in half and outline on paper similarly folded; then cut a whole flock of butterflies. Tell children about the migrating butterflies, and propose to let a swarm loose in the living room. Cut them in

plain wrapping or manila paper, color, and string and festoon from light-fixtures to corners, on black thread. This is decoration for an Easter party.

Blueprints

These make pretty Easter cards. Get the blueprint paper at any place where photographers' goods are sold. It must be kept absolutely away from the light, or it will darken.

Make a printing-frame of a piece of glass fitting exactly a piece of stiff flat board—binder's pasteboard will do. Strong rubber bands will hold the two together.

Make an arrangement of a spray of blossoms or leaves or a spray of seeds, such as golden-rod, lay it on an oblong of blueprint paper on the board. Place the glass over it and clamp down with rubber bands. Lay it in the bright sunshine and leave it until the paper turns blue. Remove print and wash under running water until the blue ceases to run off.

These make pretty decorations for calendars or other gifts for other seasons as well—blotters, match-scratchers, note-book covers, and for the inside and outside of scrapbooks.

It is great fun for the children to watch and make the prints, and it directs their attention to the grace and beauty of flower and leaf forms.

You can make a "Shoe Scraper" for Your Backdoor Step
A SMALL NAIL
CAP
CAP OF POP-BOTTLE
BOARD
A BOARD ABOUT 12 INCHES LONG, 6 INCHES WIDE AND AN INCH THICK
Cobb Shinn

Does Mother ever give you a scolding for tracking mud into the house? If she does why don't you make a shoe scraper for the back door? Just save the tops of pop-bottles. A few nails and a board is all that you need. A coat of paint would make it look much better and keep the tops from rusting away in the winter time.

Mother will like you to make one of these match scratchers for her to hang by the gas stove. It is very easy to do. All that you need is a small piece of sand-paper. Mount it on a piece of cardboard and use your crayons to make the picture of the cat.

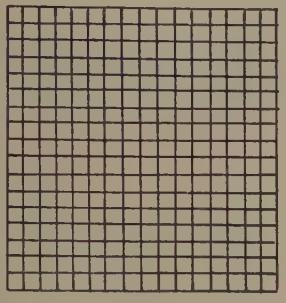
Drawing by Cobb Shinn

You may use either paper or ribbon for the book mark. By using this system of drawing you are able to draw and color the bird. If you don't care to draw the bird, you may cut one out of some old magazine, color it, and paste it on the ribbon.

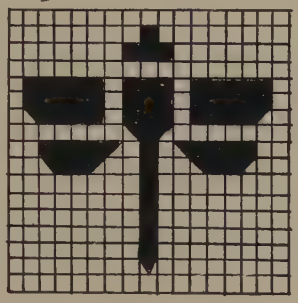
A Birthday Present for Mother

OIL-CLOTH MATS

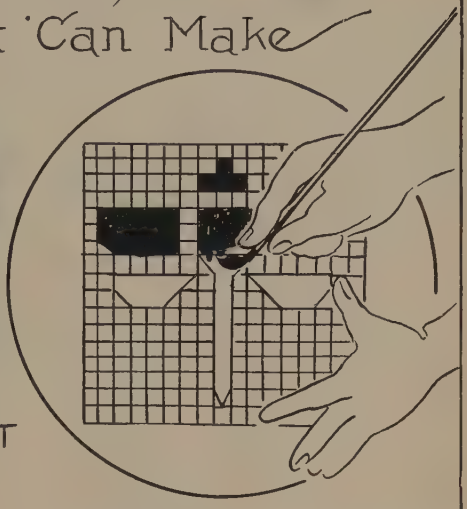
Something that You Can Make



MARK OFF 15 SQUARES EACH WAY ON THIN CARDBOARD



DRAW IN AND THEN CUT OUT THIS DESIGN



PLACE YOUR STENCIL ON THE OIL-CLOTH AND CAREFULLY PAINT IN THE DESIGN WITH OIL COLORS

Drawing by Cobb Shinn

How Mother would appreciate a birthday present made by your little fingers. Very little material is needed, a quarter of a yard of oilcloth will be plenty, for the mats should not be over six inches in diameter. You see here the very easy way to make the stencil. The smallest can of paint that you can buy will be plenty, for very little paint is needed. Don't you think that you can make a set of these mats, and don't you agree that they would make a lovely present for Mother?

The foundation of the calendar is an oblong piece of white cardboard, and you are going to draw the butterfly, which is a very easy matter. Color it with your water colors or crayons. The little calendar pads can be bought at the little shop down at the corner for a penny. Another penny will buy enough baby ribbon for the bow at the top.

MOTHER'S COOKING SCHOOL

BY GRACE BARDEN CARLETON

To the Mother:

This Section includes the first principles of cooking, expressed in simple language. The five food principles are explained, and samples illustrating each are cooked. The right way of preparing food, so that it may serve its purpose of nutriment economically, is emphasized. A wholesome way of using left-overs is outlined.

Through these lessons children, the future home-makers, acquire the skill of working systematically and efficiently in the kitchen.

MEASUREMENTS

All measurements in the recipes given are level.

The measurements must be accurate to insure good results.

Dry materials should be sifted before measuring.

A cupful—Fill the cup with the material, being careful not to shake it down, and level it off with a knife.

A spoonful—Dip the spoon into the substance, fill it, and level it off with a knife.

One-half spoonful—Divide lengthwise.

Quarter of a spoonful—Divide the half crosswise.

Eighth spoonful—Divide the quarter spoonful crosswise.

A speck of anything is as much as will stay on the tip of a pointed knife.

ALL MATERIAL SHOULD BE MEASURED LEVEL

HALF A SPOONFUL IS OBTAINED BY DIVIDING THROUGH THE MIDDLE LENGTHWISE

TABLE OF MEASURES

3 teaspoonfuls equal 1 tablespoonful.
1 cup equals ½ pint.
16 tablespoonfuls of dry ingredients equal one cupful.
12 tablespoonfuls of liquid equal one cupful.
4 cupfuls equal one quart.

TABLE OF WEIGHTS

2 cups of butter are equal to 1 pound.
2 cups of granulated sugar are equal to 1 pound.
4 cups of flour are equal to 1 pound.
2 tablespoonfuls of butter are equal to 1 ounce.
4 tablespoonfuls of flour are equal to 1 ounce.

ABBREVIATIONS USED

tsp.	= teaspoonful	oz.	= ounce
tbsp.	= tablespoonful	lb.	= pound
c.	= cupful	spk.	= speck
pt.	= pint	m.,ms.	= minute, minutes
qt.	= quart	h.	= hour

All food and utensils should be collected before beginning the lesson.

LESSON I

BAKED APPLES

"Oh, mother, how good those baked apples look!" said eight-year-old Louise one Saturday morning as she came into the sunny kitchen. "I wish I knew how to fix them like that," she added, slowly.

"Suppose you write down the directions in your new recipe book. I'll tell you how to do it while I prepare the potatoes for dinner," said mother. "Then you can fix some of the stuffed apples that father likes so much."

In a few minutes Louise was ready with her book and pencil, and mother began:

"Good cooks always have their utensils and materials ready before they begin cooking, so you may write first the utensils, then the materials, and last the directions."

So Louise wrote:

Utensils: A measuring cup, a fork, a baking pan, and a tablespoon.

Materials:

6 apples
4 tsp. sugar
4 tbsp. water
¼ tsp. cinnamon

Method:

1. Wash, pare, and core the apples.
2. Place the apples in a baking pan.
3. Mix together the sugar and cinnamon and allow one tsp. of sugar and a spk. of cinnamon for each apple. Put this in the opening from which the core was taken.
4. Cover the bottom of the dish with water.
5. Bake slowly until the apples are soft when you stick a fork into them.
6. Put in a bowl with the syrup that has been cooked out of them.
7. Serve hot or cold with milk or cream.

STUFFED APPLES

"Now you may fix the stuffed apples with the cold boiled rice that was left from breakfast," continued mother. "Prepare the apples the same as for baked apples. Mix the cinnamon and sugar with the boiled rice. (Use one tbsp. of rice for each apple.) Stuff the center of the whole cored apple with this mixture, and add three raisins to each apple. Then bake according to the directions for baked apples."

APPLE JELLY

After these were in the oven, Louise discovered a cheese-cloth bag that was hung up with an earthen dish underneath, into which a liquid was slowly dripping.

"That's the apple juice I am going to use for apple jelly," said mother. "I washed carefully the apples that I used for my apple pies and baked apples. Then I put the cores and parings in a saucepan, covered them with water, and let them cook slowly until soft throughout like apple sauce. I turned this mixture into a cheese-cloth bag, which you see is hung at three places, and let the juice drip into the earthenware bowl. No, do not use a tin dish, on account of the acid in the apple. The juice is now ready to be made into jelly."

"Oh, mother, let me do it while you are getting dinner," said Louise, eagerly. So mother began directions.

"First, you may get two jelly-glasses and put in a kettle of cold water on the back of the stove. Let the water heat gradually to the boiling point. This is called sterilizing. When the jelly is ready, remove the glasses and drain, so they will be clean and hot when the jelly is put in. Now you may put the juice in a clean saucepan, and let it boil fifteen minutes. While it is boiling, put some sugar in a shallow pan in the oven, leaving the oven door ajar, and let it heat thoroughly.

"After the juice has boiled for the required time, measure it, and add ¾ cup of sugar for each cup of the boiled juice. (If the fruit is very sour, use one cup of sugar for each cup of juice.)"

"What makes the jelly get stiff?" asked Louise as she was measuring the sugar.

"The stiffening is due to two things in the fruit —one a carbohydrate called pectin, the other an acid. Pectin is like starch, because it stiffens when cold, but, like sugar, is soluble."

"Can all fruits be used for jelly?" inquired Louise, as she put the heated sugar in the fruit juice.

"If a fruit lacks pectin the addition of sugar will not cause the fruit to jelly, and it would have to be combined with a fruit rich in pectin. Strawberries contain little pectin, so you would want to add a fruit rich in pectin, as currants. Grapes, apples, plums, and currants make fine jelly. Also, long cooking of pectin prevents it from stiffening, so that is why we heat the sugar before adding it."

"How can I tell when it is done?" asked Louise, as she removed the scum from the top of the boiling mixture with her spoon.

"When it falls from the spoon in heavy drops, or when a drop of it stiffens on a cool plate. If you use the second test, be careful that the juice does not cook too long and too rapidly while you are doing it," added mother.

Then Louise poured the mixture into the sterilized glasses, and felt proud, and happy over her morning's work.

"When the jelly is cold you may melt some paraffine in a saucepan, and pour over it to about one-eighth inch in depth, so as to protect it from mold," said mother. "Then you can keep it to show to grandma when she comes on Thanksgiving Day."

"Will you tell me what that big word carbohydrate means, so that I can write it down in my book?" asked Louise. And she wrote: "A carbohydrate is a sugary or starchy food that gives heat and energy to the body."

"To-morrow you may help me cook and fix the potatoes for dinner if you like," said mother. "They are an example of carbohydrates, because they are a starchy food like the rice you used this morning in the stuffed apples."

LESSON II

POTATOES

"Now, Louise, you may put the potatoes on to boil while I get the bread ready for the tins," said mother the next day as the clock was striking eleven. "We'll cook more than we need for dinner so as to make for supper the potato cakes that brother likes so much. You may get eight potatoes of equal size, so they will cook evenly, and scrub them thoroughly with the brush. Now pare them with a sharp knife, as most of the valuable mineral matter lies just beneath the skin.

"Is the water boiling in the saucepan? That's good—the water should always be boiling when the potatoes are put in, so all the goodness will stay in them. Now add one tsp. of salt for every quart of water. Then drop in the potatoes and let them cook until you can stick a fork into them easily.

"While they are boiling you may wash a potato and put it in the oven for grandpa. A baked

potato is more easily digested than a potato cooked in any other way, as some of the starch is changed into dextrin, or partly digested, by the intense heat. Now you have it thoroughly washed, put it on the grate in the hot oven and let it bake until soft when tested with a fork (about 40—45 ms.). When it is done break the

TEST POTATOES WITH A FORK TO TELL WHEN SOFT

skin, so as to let the steam out, which prevents sogginess, and you may serve it to grandpa at once, while hot.

"Yes, potatoes are a carbohydrate, because they are a starchy food. This bread, too, contains starch, as it is made from wheat flour, and also gives us heat and energy, like the rice you used yesterday.

"Now the boiled potatoes are soft, drain off the water, uncover the saucepan and shake it gently over a low heat until the outside of the potato is dry. Fix the potatoes just as you have written down the recipe in your note-book."

MASHED POTATO

Utensils: A fork, saucepan, potato masher, large bowl, tablespoon, teaspoon.

Materials:

6 potatoes — ½ tsp. salt
spk. pepper — 2 tbsp. butter
2 tbsp. hot milk

Method:

1. Put the potatoes in a large bowl and mash until they are perfectly fine.
2. Add the salt, butter, pepper, and hot milk.
3. Beat until the mixture is light and creamy.
4. Pile it lightly on a hot dish, without smoothing, and serve at once.

"Now we've had dinner, you may write down the directions for making potato cakes while I wash the dishes," said mother.

POTATO CAKES

Utensils: A measuring cup, frying pan, spatula, and tablespoon.

Materials:

2 tbsp. butter — 2 tbsp. flour
2 cups cold mashed potato

Method:

1. Shape the cold mashed potato in small cakes.
2. Roll in flour.
3. Melt the butter in the frying pan and put in the cakes.
4. Brown on one side, then turn and brown on the other.
5. Serve hot.

"How did I fix the potato nests that we had for supper last night? That's easy. You can write down the directions in a few minutes."

POTATO NESTS

Utensils: A measuring cup, tablespoon, large plate.

Materials:

4 cups cold mashed potato
2 cups carrot cubes, or 2 cups peas, 1 egg

Method:

1. Fix the mashed potatoes on a large plate in the form of a mound.
2. Hollow out the center.
3. Fill this center with boiled carrots cut in small squares, or boiled peas.
4. Brush over the potato with a beaten egg.
5. Brown in the oven.
6. Serve at once.

"Yes, you may fix potato nests some day, and when you learn how to make white sauce I'll give you the recipe for creamed potatoes.

"You want to write down what mineral matter does for the body? Well, mineral matter and water are called the body regulators. The principal uses of mineral matter to the body are to furnish material for bones, and to purify the blood. Some good examples are salt, water, vegetables, and fruits."

LESSON III

"I'm glad you came down early this morning, Louise. You may make the plain toast for Father while I get his coffee ready. Then I'll tell you how to fix the milk toast for Grandpa.

TOAST

"Yes, always use stale bread for toast (at least two days old). Cut the slices about ¼ inch thick. Put them in a toaster, and hold it well above the fire until the bread is dry, then bring the slices nearer the heat until both sides are light brown. Butter them evenly while they are hot, and take it to Papa at once. Good toast can be made in the oven if the fire is hot, but if it is not the toast will be hard and tough.

"Now you may write down the directions for milk toast. One cup of milk is enough for three slices of bread."

MILK TOAST (WHITE SAUCE)

Utensils: Saucepan, measuring cup, knife, toaster and spoons.

Materials:

2 tbsp. butter — 1 c. milk
2 tbsp. flour — ⅛ tsp. salt
3 slices stale bread

Method:

Prepare the dry toast according to the directions given above, and cover with a clean cloth until used.

WHITE SAUCE

1. Melt the butter.
2. Add the flour and seasoning, and stir until well blended.
3. Add the cold milk, and cook until the mixture is thick and smooth, stirring constantly.

Place the toast on a serving dish and pour the white sauce over it. Serve at once.

"It is important to know how to make white sauce well, Louise, as it is used for so many different things in cooking. This table will help you to remember the different kinds easily, and they are all made the same as for milk toast."

TABLE OF WHITE SAUCE

Milk	Butter	Flour	Salt
Thin			
1 c.	1 tbsp.	1 tbsp.	¼ tsp.
Medium			
1 c.	2 tbsp.	2 tbsp.	¼ tsp.
Thick			
1 c.	3 tbsp.	3 tbsp.	¼ tsp.

"The thin white sauce is used for scalloped dishes and creamy soups, the medium for creamed vegetables, meat, fish, and cream toast, and the thick for croquettes. To-morrow I hope you can give me the table for white sauce; also the method, and tell for what each is used."

"Why do we give toast to sick people?"

"Well, dextrin is formed when starch is heated to 320° F. It is more easily digested than fresh bread, because some of the starch is changed into dextrin when the bread is toasted."

LESSON IV

CEREALS

"Now we have time this evening, Louise, we'll talk about the cereals, and you may write down some of the recipes for them in your notebook, and make them this week. I'll explain a little about them first.

"The cereals were named from Ceres, the goddess of grain and the harvest, and include the grains and cultivated grasses the seeds of which are used for food. The cereals contain a larger quantity of carbohydrate than any of the other foodstuffs, so are classed as carbohydrate foods. Since they are largely carbohydrate, the acid and mineral substances contained in fruits, fresh or stewed, increase their food value. Cereals require long cooking to soften the cellulose, and to swell the large amount of starch. Now you may write in your book."

1. Fine cereals should first be mixed with cold water to prevent lumping.
2. Pour the cereal into boiling salted water, using 1 teaspoonful salt for every cup of cereal.
3. Cook directly over the flame for 10 ms.,

WHEN STIRRING RICE, ALWAYS USE A FORK TO AVOID BREAKING KERNELS

stirring constantly. 4. Then continue the cooking over boiling water until the cereal is thoroughly cooked, the time depending on the cereal.

"Cereals may be cooked the day before, and heated for breakfast the next morning. The double boiler is best for cereals, but the fireless cooker can be used to advantage."

Utensils needed for cooking cereals: Double boiler, saucepan, measuring cup, teaspoon, tablespoon.

ROLLED OATS

Materials:

1 c. rolled oats — 3 c. boiling water
1 tsp. salt

Method:

1. Pick over the oats, and remove any particles of dirt.
2. Put the boiling water and salt into the upper part of a double boiler, and sprinkle in the oats.
3. Cook it over the fire for 10 ms., stirring it constantly.
4. Cover, and cook 30 ms. longer over boiling water.

CREAM OF WHEAT

Materials:

1 c. cream of wheat — 4 c. water
1 tsp. salt

Method:

1. Mix the cream of wheat with the cold water.
2. Add 1 tsp. of salt to the boiling water in the top part of the double boiler.
3. Add cream of wheat, and cook 10 ms. directly over the heat.
4. Put in the top part of the double boiler and cook 45 ms.

CORNMEAL MUSH

Materials:

1 c. cornmeal — 1 c. cold water
1 tsp. salt — 2 c. boiling water

Method:

1. Mix the meal, salt, and cold water thoroughly in the upper part of a double boiler.
2. Smooth out all lumps.
3. Pour on boiling water, and cook it directly over the fire for 10 ms., stirring it constantly.
4. Cover it, and cook it over boiling water for one and one-half hours.
5. Serve it hot with cream or milk.

FRIED CORNMEAL MUSH

Pack cornmeal mush in greased, one-pound baking powder boxes, or small bread pan, cool, and cover. Cut in slices and sauté. Serve it plain, or with butter and maple syrup.

"What is the difference between frying and sautéing, Mother?"

"Sautéing is browning in a small amount of fat, and frying is browning in deep fat, such as I use when frying doughnuts."

BOILED RICE

(Use saucepan; cook directly over heat)

Materials:

1 c. rice — 1 tsp. salt
2 qts. boiling water

Method:

1. Pick over rice and wash thoroughly.
2. Add slowly to boiling salted water.
3. Boil thirty minutes in a saucepan, or until the grain, taken between the thumb and finger, is soft.
4. Drain in a coarse strainer, and pour over one quart of hot water to separate the grains.
5. Return to the saucepan, place on back of the stove to dry off when kernels become distinct.
6. When stirring rice, always use a fork to prevent breaking the kernels.

Note—If one cooks rice in this way, the water in which it is cooked should be saved, as much

starchy material is left in it. It may be used for thickening soups.

To wash rice, put it in a wire strainer, and let the water from the faucet run through.

STEAMED RICE

(Use double boiler)

Materials.

1 c. rice — 1 tsp. salt
3 c. boiling water

Method:

1. Pour the washed rice into the boiling salted water.
2. Cook directly over the heat for 5 ms., stirring constantly to prevent sticking to the pan.
3. Place in the upper part of the double boiler and cook 40 ms., or until the kernels are soft.

Note—Some people prefer to cook rice in a double boiler so that none of the food material is lost. Rice prepared in these ways may be used as a vegetable, cereal, breads, soup-making, as a basis for scalloped dishes combined with meat, vegetables, cheese, or nuts, and as desserts.

CEREAL PUDDING

"Yes, there is a cereal pudding that Sister likes so much. You may make it to-night if you like."

Utensils: Double boiler, teaspoon, tablespoon, measuring cup, egg-beater.

Materials:

4 c. milk — 2 eggs
½ c. cream of wheat — 3 tbsp. cocoa
4 tbsp. sugar

Method:

1. Scald 3 c. milk in top part of double boiler.
2. Add 1 c. of cold milk to the cream of wheat and stir until it makes a smooth paste.
3. Pour the cream of wheat into the scalded milk, and cook 30 ms., stirring constantly.
4. Mix together the cocoa and sugar, and add the beaten eggs.
5. Pour over the cream of wheat and mix thoroughly.
6. Return to the double boiler and cook 5 ms. or longer, stirring constantly.
7. Remove from heat, and pour into a pudding dish.
8. Serve hot or cold, with cream and sugar.

Note—Milk is scalded when small bubbles appear around the edge and a scum forms on the top.

"Always remember, Louise, never throw away any cold cereal. It can be used in many different ways to make very appetizing dishes, such as puddings, muffins, griddle-cakes, omelets, breads, and scalloped dishes.

"Yes, I'll tell you something about cellulose now. It is found in fruits, vegetables, and their skins. It is also in seeds and their coverings. It is very tough, and requires long cooking to become softenend. Cellulose is good for us because it has mineral matter, and gives bulk to our foods, and thus makes them easier to digest."

LESSON V

"It is so cold this evening, Louise, I think Papa would like a hot cream soup for supper, what kind shall we make?

"Cream of tomato soup? Yes, that will be good.

"A cream soup usually consists of a thin white sauce in combination with the strained pulp of a vegetable.

"Tell me what you remember, Louise, about thin white sauce."

"To make thin white sauce we take 1 tbsp. of flour and 1 tbsp. of butter for every cup of milk."

"Yes, it is easy to make cream soups when you know about the white sauce. Now you may write down the recipe."

CREAM OF TOMATO SOUP

Utensils: 2 saucepans, strainer, measuring cup, teaspoon, tablespoon.

Materials:

1 can tomatoes — 3 tbsp. butter
¼ tsp. baking soda — 3 tbsp. flour
3 c. milk — 1 tsp. salt

Method:

1. Put the tomatoes in a saucepan and cook at a low temperature for 20 ms.
2. Press the tomatoes through a strainer, and add the soda to the pulp.
3. Melt the butter.
4. Stir in the flour and seasoning.

5. Add the cold milk and let cook until it thickens slightly, stirring constantly.

6. Add the hot tomato pulp to the white sauce and serve at once.

"Why do you add the soda to the tomatoes, Mother?"

"In making tomato soup we must be careful that the acid in the tomatoes does not curdle the milk. The soda helps to neutralize the acid. Also, do not combine the tomato pulp with the white sauce till just before the soup is served.

"A cream soup is a very nourishing dish, and is an excellent way of using up left-overs. Vegetables too old to serve whole may be used in cream soups. By putting the pulp through a strainer the hull and coarse fiber is removed. Left-over bits of meat, fish, or chicken can be used also by being ground and heated with a little liquid before being strained and added to the white sauce.

"I have some stale bread, you may use for croutons, Louise."

CROUTONS

Cut the stale bread into slices, remove the crusts, and spread with butter. Cut in ½-inch cubes, and bake in the oven until a golden brown.

LESSON VI

MUFFINS, BISCUITS, AND TEA CAKES

"Would you like to make some muffins for dinner, Louise, while I am preparing the vegetables?

"Yes, muffins are a drop-batter. They contain one cup of liquid to two cups of flour. You may make the one-egg muffins, and then I will let you write down some recipes for different kinds. If you can remember the general directions you will be able to make any kind of muffins."

MUFFIN MIXTURE IS A TYPICAL DROP BATTER

GENERAL DIRECTIONS FOR MUFFINS

1. Mix all dry ingredients and sift them.
2. Add the egg (well-beaten), the milk, and melted shortening. Beat well.
3. Fill well-greased muffin tins half full.
4. Bake in a moderate oven about 25 ms., or until firm in the center.

ONE-EGG MUFFINS

Utensils: Measuring cup, 2 mixing bowls, muffin tins, flour sifter, egg-beater, teaspoon, tablespoon.

Materials:

2 c. flour	3 tbsp. sugar
4 tbsp. melted shortening	1 egg
4 tsp. baking powder	¾ c. milk
½ tsp. salt	

Method:

1. Mix and sift the dry ingredients.
2. Add the milk, beaten egg, and melted shortening.
3. Beat well.
4. Pour into well-greased muffin tins.
5. Bake in a moderate oven 25 ms.

BLUEBERRY MUFFINS

These muffins may be varied by adding another tbsp. of sugar, and stirring in a cup of blueberries just before putting into the tins.

GRAHAM MUFFINS AND CORNMEAL MUFFINS

1 c. graham flour
1 c. flour
3 tbsp. sugar
4 tsp. baking powder
1 tsp. salt
1 c. milk
1 egg
3 tbsp. melted shortening

Follow the general directions for making muffins.

"One can use this same recipe for cornmeal muffins by substituting a cup of cornmeal for the graham flour."

"Left-over cooked cereals are good in muffins. You may write down two recipes, Louise, in which you can use the cereal in this way."

OATMEAL MUFFINS

Materials:

1 c. cooked oatmeal
1¼ c. flour
4 tsp. baking powder
1 tbsp. sugar
2 tbsp. melted shortening
½ tsp. salt
1 egg
½ c. milk

Method:

Follow the general directions for mixing muffins. Add the cooked cereal last, and beat well before dropping in the muffin tins.

RICE MUFFINS

Materials:

1½ c. flour
3 tsp. baking powder
1 c. boiled rice
2 eggs
2 tbsp. melted shortening
½ tsp. salt
1 c. milk
2 tbsp. sugar

Method:

1. Separate the yolks from the whites of the eggs.
2. Beat the yolks well, and add to them the milk, melted shortening, and boiled rice.
3. Mix and sift the flour, salt, and baking powder, and add them to the above mixture.
4. Beat the egg whites stiff, and fold them in last.
5. Drop into the well-greased muffin tins, and bake about 25 ms. in a moderate oven.

Note—Always use measuring cup for measuring dry ingredients first, then the liquids, and you will need to use only one cup.

Batters should be beaten, and stirred with a spoon.

"Do you remember the pudding you liked so much that you had at Grandma's last week? It was made from left-over cornmeal muffins.

ALWAYS CREAM BUTTER WITH A WOODEN SPOON

Would you like to write down the recipe? It will take only a few minutes."

CORNMEAL MUFFIN PUDDING

Utensils: Measuring cup, baking dish, tablespoon, teaspoon.

Materials:

2 c. muffin crumbs
4 c. scalded milk
2 tbsp. sugar
2 tbsp. seeded raisins
¼ tsp. cinnamon

Method:

1. Soak the crumbs in the milk until soft.
2. Add the sugar, cinnamon, and raisins.
3. Turn out into a buttered baking dish and bake 15 ms. in a moderate oven, or until firm in the center.
4. Serve with a hard sauce.

HARD SAUCE

Materials:

4 tbsp. butter
⅔ c. powdered sugar
½ tsp. vanilla

Method:

1. Cream the butter.
2. Add the sugar gradually.
3. Add the flavoring, and beat until creamy.

"Some warm baking-powder biscuit would taste good with the maple syrup for supper tonight, Louise. However, it is too early to make them now, so we will talk about the recipe and

LOUISE MAKES A CINNAMON ROLL

directions. A dough is a mixture stiff enough to be handled on a board. Biscuits are an example of a soft-dough mixture, and should be mixed with a knife. For soft doughs we use three cups flour to one cup liquid."

BAKING-POWDER BISCUIT

Utensils: Measuring cup, knife, rolling pin, sifter, teaspoon, tablespoon, biscuit cutter, baking pan and a bread board.

Materials:

2 c. flour	4 tsp. baking-powder
1 tsp. salt	1 tbsp. shortening
	¾ c. milk

Method:

1. Mix and sift the dry ingredients.
2. Cut in the shortening with two knives.
3. Add the liquid slowly, stirring with a knife.
4. Toss on a slightly floured board.
5. Pat out to about ½ inch in thickness.
6. Shape with a floured biscuit-cutter.
7. Bake on a well-greased pan 12 to 15 ms. in a hot oven.

Note—Drop biscuit may be made from the recipe for baking-powder biscuit, with the addition of ¼ cup more milk. Drop by spoonfuls on an oiled pan about ½ inch apart. Bake in a hot oven about 10 ms., or until a delicate brown.

TEA CAKES

These tea cakes are a drop batter, and are nice to serve at an afternoon tea or lunch.

Utensils: The same as for baking-powder biscuit.

Materials:

1½ c. flour	3 tsp. baking-powder
½ tsp. salt	3 tbsp. sugar
4 tbsp. shortening	1 egg
¼ c. milk	½ c. seeded raisins (cut in small pieces)

Method:

1. Mix, and sift dry ingredients.
2. Cut in the shortening with two knives.
3. Add the milk and the well-beaten egg.
4. Add the raisins, floured and cut in small pieces.
5. Drop from a teaspoon onto a well-greased baking pan or into muffin tins.
6. Bake in a moderate oven about 12 ms., or until delicate brown.

"Now, you have the biscuits already to put on the board, I see. Biscuit-dough should not be rolled, but patted out gently from the center. That's right. Would you like to make a cinnamon roll of the batter you have left?

"Yes, I will show you how. Roll it out gently to about ¼ inch in thickness. Sprinkle it over with a little sugar and cinnamon. Now begin at one end, and roll it up like a jelly roll. Cut in pieces about 1 inch in thickness, and place on well-greased tins, cut side down. Bake about 15 ms., in a moderate oven.

"Yes, it does look good. Instead of the cinnamon you might have used currants, raisins, or chopped apples.

"Would you like to make enough for supper some night? Then for the large amount use the baking-powder recipe, with 1 tsp. cinnamon and 2 tbsp. sugar. If you want the fruit, you would need ½ c. raisins or currants, or 1 c. of chopped apple."

LESSON VII

CAKE

"I am going to make several kinds of cake this morning, Louise, and you may help if you would like. These are a few of the important points in cake-baking.

"Get the tins and all the ingredients together before beginning to mix the cake. Also see that the oven is ready. If a piece of white paper turns a deep yellow in 5 ms., the oven is of the right temperature for butter cake. Sponge cake requires a more moderate oven. Grease the pan with Crisco or other fat. Use a wooden spoon for creaming the butter.

"First we will make a two-egg cake, which is an excellent recipe, because it can be varied in so many different ways by adding different flavorings—cocoa, spices, citron, raisins, or currants. This morning we will use only vanilla."

TWO-EGG CAKE

Utensils: Wooden spoon, mixing bowl, egg-beater, tablespoon, teaspoon, measuring cup, sifter and cake tin.

Materials:

1 c. flour	4 tbsp. melted butter
1 tsp. baking-powder	2 eggs
1 c. sugar	½ tsp. salt
	1 tsp. vanilla

Method:

1. Mix and sift dry ingredients.

CAKE IS DONE WHEN A STEEL KNITTING NEEDLE PUT INTO THE CENTER COMES OUT CLEAN

2. Put melted butter and eggs in a measuring cup and fill it up with milk.
3. Combine the two mixtures and beat well.
4. Add flavoring.
5. Pour into a well-greased and floured cake pan, and bake about 40 ms., or until firm in the center.

TESTS FOR TELLING WHEN CAKE IS DONE

1. Shrinks from side of pan.
2. Feels spongy at the touch of the finger.
3. A steel knitting needle put in the center comes out clean.

"Yes, we will make an orange frosting for that, Louise, as you like it so much."

ORANGE FROSTING

Utensils: Mixing bowl, tablespoon, and teaspoon.

Materials:

1 tsp. lemon juice	1½ tbsp. orange juice
Yolk of one egg	Confectioner's sugar

Method:

1. Beat the yolk of the egg slightly.
2. Add the orange juice and lemon juice.
3. Stir in the confectioner's sugar until it is thick enough to spread.

SPONGE CAKE

Utensils: Egg-beater, flour-sifter, 2 mixing-bowls, teaspoon, tablespoon, and measuring cup.

Materials:

Yolks of 3 eggs	1 c. sugar
1 tbsp. hot water	1 c. flour
1½ tsp. baking-powder	¼ tsp. salt
Whites of 3 eggs	2 tsp. lemon juice

Method:

1. Beat yolks of eggs until thick, and the whites also.
2. Add sugar gradually, and beat until well blended.
3. Add the hot water.
4. Stir in flour mixed, and sifted with baking-powder and salt.
5. Fold in whites of eggs and flavoring.
6. Pour in a well-greased and floured baking-pan.
7. Bake about 35 ms. in a moderate oven.

"There are only two classes of cakes, Louise. The cakes with fat, and those without fat. We have made an example of each to-day. The other cakes are variations of these two kinds. The method of mixing the two cakes is different, and the sponge cake requires a cooler oven."

LESSON VIII

EGGS, OMELETS, AND CUSTARDS

"Oh, Mother, what nice looking eggs these are," said Louise as she came down stairs one morning.

"Grandpa brought them from the country: would you like one for your breakfast?"

"Yes, I would like a soft-cooked one."

For soft-cooked eggs one needs only:

Utensil: Saucepan.

Materials:

Fresh egg	Boiling water

Method:

1. Put the eggs in a saucepan.
2. Cover with boiling water.
3. Put the lid on the saucepan, and place on the back of the stove (or over a very low heat) for 5 ms.

"How did you prepare the eggs we had for breakfast yesterday, Mother?"

"Those were scrambled, Louise, the directions are very easy."

SCRAMBLED EGGS

Utensils: Saucepan, measuring cup, tablespoon, teaspoon, frying-pan.

Materials:

3 eggs	¼ tsp. salt
½ c. milk	Spk. pepper
1 tbsp. butter	

Method:

1. Beat eggs slightly with fork.
2. Add salt, pepper, and milk.
3. Heat frying-pan, put in butter, and when melted turn in the mixture.
4. Cook until of creamy consistency, stirring and scraping from the bottom of the pan.
5. Serve hot.

"Would you like to make a puffy omelet for our breakfast on Sunday morning, Louise?

"That's good. You can make it all by yourself after you write the directions down."

PUFFY OMELET

Utensils: Frying-pan, or omelet-pan, tablespoon, teaspoon, spatula.

Materials:

4 eggs	½ tsp. salt
4 tbsp. water	Spk. pepper
2 tbsp. butter	

Method:

1. Separate yolks and whites of eggs.
2. Beat yolks until creamy.
3. Add seasoning and hot water.
4. Beat egg whites until stiff.
5. Cut and fold into yolks mixture.
6. Place butter in hot frying-pan.
7. Turn the egg mixture into the pan.
8. Cook slowly.
9. When omelet has set and delicately browned underneath, place it in hot oven for a few minutes to dry the top.
10. Fold through the center, and serve immediately.

"I am going to make baked custard for supper to-night, Louise. This is the recipe I will use, and you may watch me work, if you like."

BAKED CUSTARD

Utensils: Mixing-bowl, egg-beater, measuring cup, tablespoon, teaspoon, a large baking dish, or 8 small molds.

Materials:

4 c. scalded milk	4 eggs
½ c. sugar	¼ tsp. salt
¼ tsp. nutmeg	

Method:

1. Scald milk.
2. Beat egg slightly, add sugar, salt, and nutmeg.
3. Pour the scalded milk into this, and mix well.
4. Turn into buttered molds.
5. Set in pan of hot water.
6. Bake in slow oven until firm in the center.

Variations of plain custard may be made by adding 1 tsp. of cocoa for each egg to above recipe, by using vanilla, instead of nutmeg, or 1 tsp. of cocoanut for each egg.

"What food class do eggs belong to, Mother?"

"Eggs are a protein food; they build up and repair the tissues of the body. They are a nutritious food, and, if properly cooked, are easily digested. Some of the other examples of protein are milk, cheese, meat, beans, and nuts."

"Why do you use eggs in cooking?"

"We use eggs in cooking for three reasons: to make light, to make rich, and to thicken."

LESSON IX

SUPPER DISHES

"We are going to have beef stew with dumplings for supper to-night, Louise.

"Yes, I would like you to help me. You may write down the directions while I am preparing the vegetables; then you can make the dumplings."

BEEF STEW WITH DUMPLINGS

Utensils: Measuring-cup, tablespoon, teaspoon, paring knife, large saucepan, mixing bowl.

Materials:

2 lbs. lean beef	1 small carrot
3 tbsp. flour	1 small turnip
1 tsp. salt	4 medium-sized potatoes
4 c. hot water	1 tbsp. butter
1 small onion	

Method:

1. Cut the meat into small squares.
2. Pare the vegetables, and cut in small squares.
3. Put the butter in a saucepan, and brown the onion and meat in the fat.
4. Add the hot water, and cook the meat in the saucepan until it is tender.
5. Add the carrots and turnips, and cook 5 ms.
6. Add potatoes, and cook 5 ms. longer.
7. Drop the dumpling by spoonfuls in the stew.
8. Cook, tightly covered, for 20 ms.
9. Serve hot.

DUMPLINGS

Materials:

2 c. flour	½ tsp. salt
4 tsp. baking-powder	2 tbsp. shortening
1 c. milk	

Method:

1. Mix and sift the dry ingredients.
2. Cut in the shortening with two knives.

3. Add milk slowly, mixing with a knife.
4. Drop, by spoonfuls, in top of the stew.
5. Cook, tightly covered, 20 ms.

"You would like the recipe for meat-balls that we had last night for supper? Yes, they are good with brown sauce."

MEAT BALLS

Utensils: Frying-pan, measuring cup, tablespoon, teaspoon, knife.

Materials:

1 lb. lean raw beef chopped fine	1 c. soft bread crumbs
	1 tsp. salt
1 egg	1 tsp. sage
1 slice of onion	2 tbsp. shortening

Method:

1. Chop the onion fine.
2. Beat the egg.
3. Mix all the ingredients together well, except the shortening.
4. Shape the mixture in small flat cakes.
5. Heat the frying-pan and put in the fat.
6. Sauté the meat cakes a delicate brown on each side.
7. Serve hot with brown sauce.

BROWN SAUCE

Materials:

2 tbsp. flour	1 c. hot water
½ tsp. salt	2 tbsp. shortening

Method:

1. To the fat in the frying-pan add 2 tbsp. of flour.
2. Add the hot water slowly.
3. Cook until the mixture boils, stirring constantly.
4. Season with the salt.

"Salmon loaf is an attractive dish, too. Yes, you may write the recipe for that also."

SALMON LOAF

Utensils: Tablespoon, teaspoon, measuring cup, mixing-bowl, egg-beater, baking-pan.

Materials:

1 can salmon	⅛ tsp. pepper
1 c. soft bread crumbs	¼ c. milk
1 tbsp. parsley	2 egg whites
2 egg yolks	1 tbsp. lemon juice
1 tbsp. melted butter	

Method:

1. Remove the bones from the salmon, also the skin.
2. Add the beaten yolks, melted butter, salt, pepper, lemon juice, milk, and chopped parsley to the crumbs.
3. Combine the two mixtures, and mix well.
4. Beat the egg whites stiff, and fold in.
5. Turn in a well-greased pan, and press the mixture in the pan tightly.
6. Bake in a moderate oven 40 ms., or until the salmon loaf is firm in the center.

Note—A medium white sauce with peas may be served with the salmon loaf, if desired.

"Try to remember, Louise, that both meat and fish are protein foods, that build up and repair the tissues of the body."

LESSON X

SOME SIMPLE DESSERTS

"This morning, Louise, you may help me with the chocolate corn-starch pudding for dinner. We will serve it with whipped cream."

CHOCOLATE CORN-STARCH PUDDING

Utensils: Double boiler, tablespoon, teaspoon, measuring cup, 1 large mold, or 6 small molds.

Materials:

4 tbsp. corn-starch	4 tbsp.cocoa
2 c. milk	1 tsp. vanilla
½ c. sugar	

Method:

1. Scald the milk in a double boiler.
2. Mix together the sugar, cocoa, and corn-starch.
3. Add the hot milk to this mixture and stir well.
4. Return to the double boiler and cook 30 ms., stirring to prevent lumping.
5. Remove from heat and add the flavoring.
6. Pour into molds which have been dipped in cold water.
7. Serve with cream and sugar, or whipped cream.

"Now, we will make the orange jelly that I am going to have as dessert for supper, so that it will become firm."

ORANGE JELLY

Utensils: Measuring cup, tablespoon, teaspoon, 6 molds, mixing-bowl.

Materials:

3 tbsp. granulated gelatin
½ c. orange juice ½ c. cold water
2 c. boiling water ½ c. sugar

Method:

1. Soak gelatin 5 ms. in cold water.
2. Dissolve in boiling water.
3. Add to sugar and orange juice.
4. Turn into the molds, and chill. (The molds should be dipped in cold water.)
5. Serve with marshmallow sauce.

MARSHMALLOW SAUCE

Materials:

1 c. marshmallow crême ¼ tsp. vanilla
3 tbsp. scalded milk

Method:

1. Add scalded milk to marshmallow crême, and stir until blended.
2. Add vanilla, and mix well.

"With the lemon jelly I am going to have marguerites. We will wait until just before supper to make them, however, as they are best served while crisp."

MARGUERITES

Utensils: Egg-beater, tablespoon, teaspoon, measuring-cup, baking tin.

Materials:

2 egg whites ½ tsp. vanilla
2 tbsp. sugar ½ c. chopped nuts
⅛ tsp. baking-powder

Method:

1. Separate the yolks from the whites of the egg, being careful not to get any of the yellow in the white, as it prevents it from beating up stiff.
2. Beat the white with a Dover egg-beater until stiff enough to hold its shape.
3. Add the sugar, mixed with the baking-powder, and beat a minute longer.
4. Add the vanilla and chopped nuts.
5. Spread butter-thins, or crackers, with this mixture, and brown in the oven.

BOILED CUSTARD IS DONE WHEN IT COATS THE SPOON

"What food-class does gelatin belong to, Mother?"

"Gelatin is classed with the protein foods. It is found in the bones, skin, tendons, and connective tissues of animals. Gelatin does not dissolve in cold water, but it does dissolve in boiling water, and stiffens when put in a cool place. Gelatin should not be cooked in a boiling liquid, as it will not stiffen on cooling."

LESSON XI

COCOA AND FRUIT DRINKS

"I would like you to make the cocoa for breakfast this morning, Louise. Here is the recipe written down for you."

COCOA

Utensils: Measuring-cup, saucepan, tablespoon, teaspoon, and egg-beater.

Materials:

1 c. boiling water 3 c. milk
3 tbsp. cocoa 3 tbsp. sugar
Spk. salt

Method:

1. Mix together the cocoa, sugar, and water, and boil for 2 ms.
2. Add the milk, and let come to the boiling point.

3. Remove from the heat, add the salt, and beat with an egg-beater to prevent the formation of scum.

4. Serve hot.

Note—If one desires richer cocoa, add a tbsp. of whipped cream, or a toasted marshmallow, to each cup.

"We must remember, Louise, that cocoa is a food, not a mere thirst-quencher. It is prepared from the seed of the cocoa bean. This bean is ground, the oil being extracted, which leaves a dry powder. Cocoa is the best of hot drinks for children.

"As some of your friends, Louise, are coming this afternoon, you may make the lemon syrup for the lemonade, and fix the fruit punch, before dinner."

LEMON SYRUP

Materials:

1 c. sugar ½ c. lemon juice
2 c. water

Method:

1. Make a syrup by boiling the sugar and water ten ms.

2. Add the lemon juice.

3. Cool.

"When making the lemonade later you may add as much of this lemon syrup as desired to a glass of water. Lemonade made with the syrup does not require as much sugar, and lemon syrup may be bottled and kept on hand, to use when needed.

"Now we will get the fruit punch ready."

FRUIT PUNCH

Materials:

1 c. water 2 c. sugar
Juice of 5 lemons Juice of 4 oranges
1 bottle grape juice

Method:

1. Make a syrup by boiling the water and sugar 8 ms.

2. Add the lemon, orange, and grape juice.

3. Let stand 20 ms. to cool.

4. Strain, and add cold water to make 4 quarts of liquid.

LESSON XII

A FEW GOOD CANDY RECIPES

"Mother, we are not going to have school this afternoon. May I ask Betty, Gladys, and Lois to come in and make candy after dinner?"

Three o'clock found the four girls all gathered in the sunny homelike kitchen with aprons and caps, ready for fun.

"I'm going to give each one of you a pencil and paper so that you can write down directions," said Louise's mother. "What kind of candy would you like to make?"

Each girl had her choice, and they decided to make cocoanut creams, peppermints, creamed walnuts, stuffed dates, and popcorn balls.

COCOANUT CREAMS

Utensils: Saucepan, measuring cup, tablespoon, teaspoon, waxed paper.

Materials:

1½ c. sugar ⅓ c. shredded cocoanut
½ c. milk ½ tsp. vanilla
2 tsp. butter

Method:

1. Mix together the sugar and milk, and cook until it forms a soft ball when dropped in cold water.

2. Remove from the heat, add the cocoanut, butter, and vanilla.

3. Beat until creamy.

4. Drop from the tip of a spoon onto waxed paper.

PEPPERMINTS

Utensils: Saucepan, measuring cup, tablespoon, teaspoon, waxed paper.

Materials:

1 c. sugar ⅓ c. hot water
4 drops peppermint

Method:

1. Cook the sugar and water until it forms a soft ball when dropped into cold water.

2. Remove from fire and add peppermint.

3. Beat until the mixture becomes cloudy.

4. Drop from the tip of a spoon onto waxed paper.

Note—One may use vegetable coloring to tint the mints as desired.

LOUISE AND HER LITTLE FRIENDS MAKING CANDY ONE RAINY AFTERNOON

POPCORN BALLS

Utensils: Saucepan, measuring cup, tablespoon, teaspoon.

Materials:

1½ c. sugar
½ c. New Orleans molasses
1 tbsp. vinegar
2 tbsp. butter
¼ tsp. soda
4 qts. popped corn
½ c. water

Method:

1. Cook the sugar, butter, molasses, water and vinegar, without stirring, to the hard-ball stage.
2. When done, add the soda, and pour over the popped corn.
3. When the syrup is evenly mixed with the corn, dip the hands in cold water, take up a portion and press into a ball.
4. Dip the hands into water before forming each ball, and work quickly, because the mass soon becomes cold and hardens.
5. Keep the balls in a cold place, as they soften and grow tough in a warm room.
6. This recipe will make twelve popcorn balls.

"Mother, Betty says that candy isn't good for little girls to eat. What do you think about it?"

"Well, Louise, a little candy is good for us to eat at the end of a meal. Some sugar is valuable in the diet, because it is another source of carbohydrate, which gives heat and energy."

CREAMED WALNUTS (FONDANT)

Utensils: Egg-beater, teaspoon, bowl.

Materials:

1 egg white
Confectioner's sugar
½ tsp. vanilla

Method:

1. Beat the white of an egg until stiff.
2. Add the vanilla and confectioner's sugar until the mixture is thick enough to mold with the fingers.
3. Take a teaspoonful in the hands and shape into a small ball.
4. Flatten it and put walnuts on each side.

STUFFED DATES

1. Cut dates lengthwise and remove stones.
2. Fill the center with peanut butter, peanuts, walnuts, or fondant.
3. Shape well, and roll in granulated sugar.

THE LITTLE MOTHER'S WORK-BASKET

BY JULIA A. GLEASON

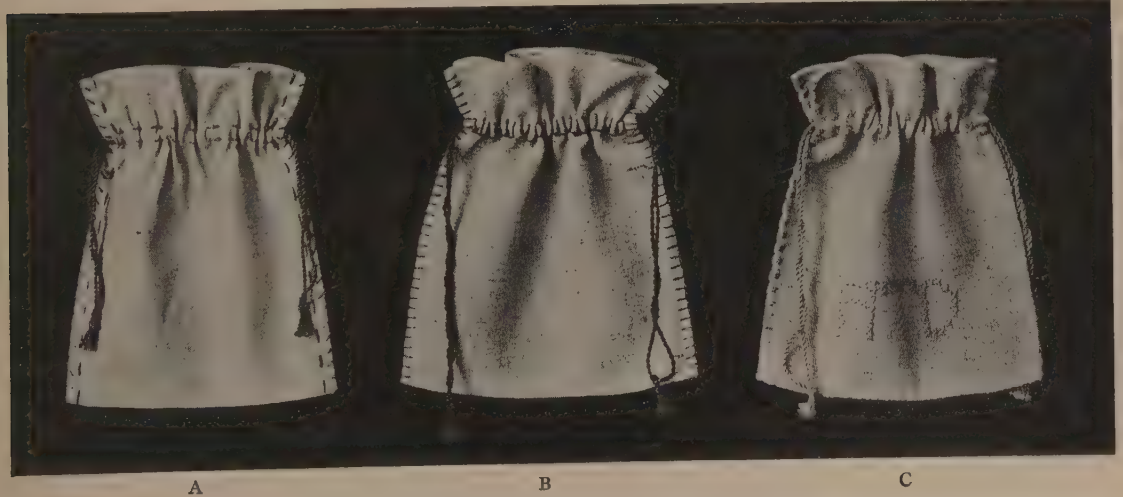
BAGS

Little girls have always liked to sew. In our great-grandmother's time there were not so many sewing machines as there are to-day, and small as well as big girls helped mother and grandmother make the sheets, pillowcases, quilts, and clothing for the entire family. Embroidery and dainty needlework were kept for special occasions, as rewards for doing well the long, hard seams. And how tired the little fingers used to get! Yet how interesting it was to make useful as well as beautiful things, and how accomplished they felt when they made all the pretty stitches in colored yarns on the samplers which we preserve as curios, but which in those days it was the ambition of each little girl to make.

To-day most of the tiresome things are done by machinery in factories, or by mother at home on her sewing machine. However, there are many useful and beautiful articles which little girls of the present can make, instead of the samplers and quilts of great-grandmother's time.

Needlecraft is a source of much pleasure and benefit to every girl who acquires the art; and many a boy will discover that it is very valuable to know how to sew on a button, mend a rent in a sail, or stitch up a canvas bag to carry utensils or provisions on a camping trip. The more a girl sews the more pleasure she will take in this work, for she will find her ability to make beautiful things grow steadily with patient, painstaking effort in all she attempts.

A bag like one of those illustrated is a good thing to make first. It may be any size. One nine by seven inches is useful for holding scissors, thimble, needles, and thread. Bags of this kind may also be used for holding handkerchiefs, stockings, knitting, or crocheting. Such a bag may be made of new material, or from scraps of various kinds. Ribbons, silks, cretonne, linen, or cotton crash, chambray, poplin, monk's cloth, and similar materials are suitable. It is prettiest when the material and the mercerized floss, which is used to sew the edges and to make the cords, harmonize in color. In the picture, bag A is made



A B C

THREE USEFUL AND PRETTY BAGS

of tan chambray, and the running and overcasting stitches are of heavy, dull green mercerized floss. Bag B is made of natural-colored linen, and finished with the blanket stitch in brown mercerized floss.

It requires one piece of material 27 inches by 9, or two pieces 14 inches by 9, to make one bag.

BAG A

A SEWING BAG MADE OF STRIPED LINEN CRASH

In the latter case, the seam at the bottom is finished like the sides.

To make the bag: Make a ¼-inch turn to the wrong side on all edges. For the top of the bag make a second turn 2 inches wide on the two ends, and baste these hems in place with the even basting stitch. To make the casing for the cord, make another line of basting ¾ inch above the first basting. Place the ends of the strip together, or if two pieces are used, lay the two together with all edges even. Baste the sides together as far as the hem, and if necessary the bottom. Then baste the ends of the hem separately from the casing to the top. Sew the edges together with one of the decorative stitches described on page 233, leaving the casing open to run the cord through, following the lines of basting. Sew the casing with the same decorative stitch used on the edges of the bag. Initials may be made in cross stitch, outline stitch, chain stitch, or couching. Other simple designs may be applied in the same way.

The two cords require eight yards of floss, four yards for each cord. Twist two strands of floss together tightly; double this cord, holding the center and the two ends securely at first; then release the center and allow the four-ply cord to twist. Finish each end with a knot and ravel out the fringe.

Bag A in the illustration is 10 by 15 inches in size, and is made of striped tan and cream-colored crash. The sides are sewed together in French seams (p. 235). The simple straight line design is worked with an over-and-over stitch in greenish tan floss, to harmonize with the stripe. The rectangular figure is in bright orange outlined in

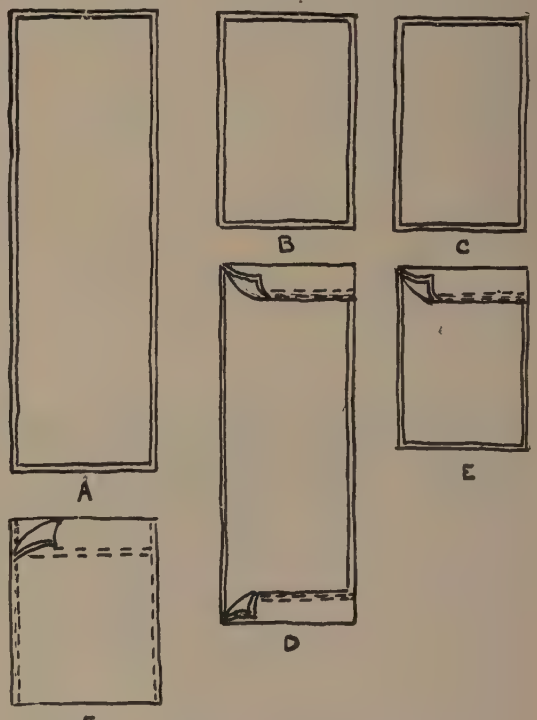


DIAGRAM SHOWING CONSTRUCTION OF SEWING BAG

greenish tan. The thread loops to hold the cord are orange, and the eight-ply cord is tan.

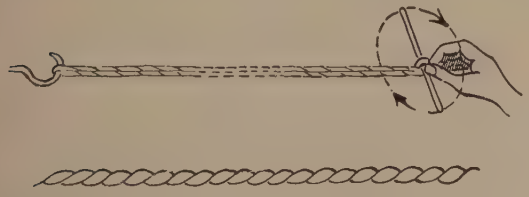
Bag B in the illustration is 10 by 15 inches in size, and is made of natural-colored linen crash. The sides and bottom are sewed together in plain seams (p. 235) with edges overcast.

Twenty-four threads are drawn about 1 inch from the bottom of the bag, and heavy brown cotton yarn is woven in to make the design. The two outside threads of brown run under five and over three threads of the crash. Then three threads

BAG B

A SEWING BAG MADE OF NATURAL-COLORED LINEN CRASH

of brown are run over the five and under the three threads of crash, alternating with the first group of brown threads. The center group of brown threads is put in like the first. The design may be varied by changing the number of threads

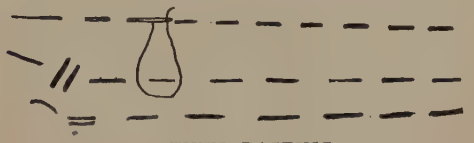


TWISTING STRANDS OF FLOSS TO MAKE A CORD

run in and the number of threads in the groups. The top of the bag is finished with a hem 1½ inch wide. The yarn is blanket-stitched over six small rings which are sewed to the top of the bag. Braided cords with knotted ends are run through to draw up the bag.

STITCHES AND SEAMS USED TO MAKE THE SEWING BAGS

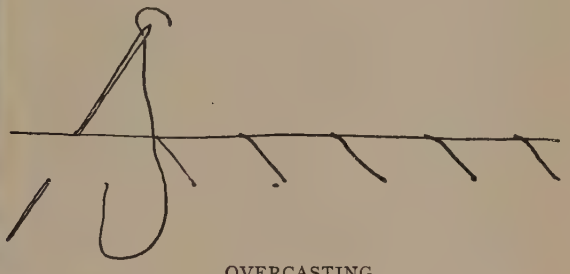
Even Basting.—In even basting the over stitch and the under stitch are the same length, usually ¼ to ½ inch. It is used to hold seams and hems until they are firmly sewed. It may be begun



EVEN BASTING

with a knot and ended with several diagonal stitches above the end of the basting; or with two back stitches.

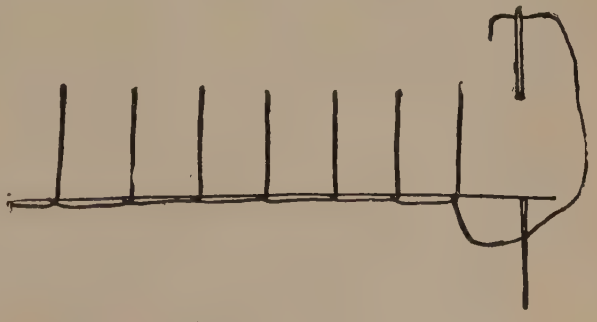
Decorative Stitches—Running Stitch.—Running is made like even basting. In bag A it is



OVERCASTING

taken ½ inch from the edge, and the stitches are ½ inch long. The beginning and ending of the thread are hidden.

Overcasting Stitch.—In bag A the edges are sewed together with overcasting stitches taken ¼

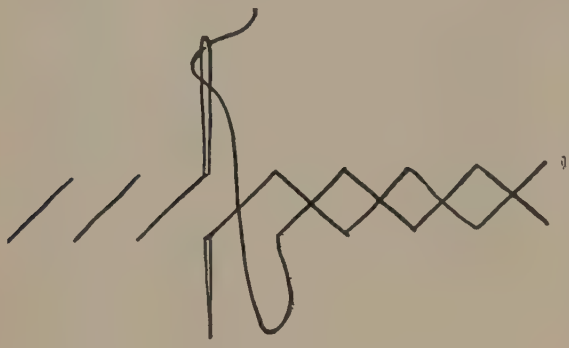


BLANKET STITCH

inch deep and ½ inch apart. The beginning and ending of the thread are hidden.

Blanket Stitch.—The blanket stitch is an edge finish. It is begun with several small running

stitches taken at right angles to the edge of the material, bringing the needle out as near as possible to the edge. The work proceeds from left to right. For the first stitch the needle is placed in the material, ⅛ to ½ inch from the edge. The thread is thrown under the point of the needle from left to right, and the needle drawn through toward the worker. Each succeeding stitch is



CROSS STITCH

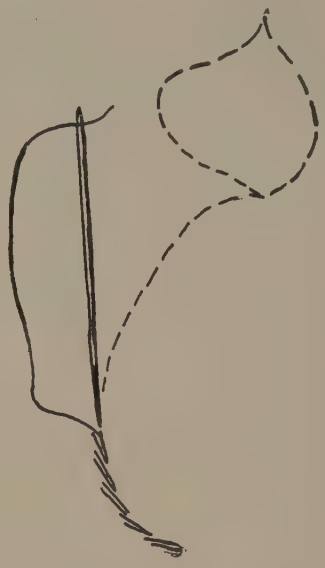
taken in the same way at the desired distance to the right of the preceding stitch and an equal distance from the edge.

Attractive variations of this stitch may be made by changing the depth and the slant of the stitches and the distance between. In bag B the blanket stitch is taken ½ inch deep and ⅝ inch apart. They are taken ¾ inch deep for the casing; the beginning and ending of the thread are hidden.

Cross Stitch.—Each cross stitch consists of two stitches that cross each other, forming the diagonals of a square. The design for cross stitch consists of a series of squares that are filled in with diagonal stitches. For this reason the work has a quaint, angular appearance, which is part of its charm. The work may be done by following the weave of certain materials, such as regularly spaced cross-barred dimity, crash and basket-weave cloth. Cross stitch canvas may be basted to plain material to mark the squares for the stitches, and is drawn out when the work is finished. Care should be taken to cross the stitches the same way each time. The cross stitch is used for initials, for marking linens, and for various designs on garments and household articles. Either the designs or the background may be worked in cross stitch.

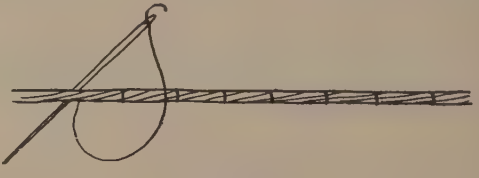
The cross stitch on the edge of bag C is made by taking the over-casting stitch first in one direction, as in bag A, and then in the opposite direction. The beginning and ending of the thread are hidden.

Outline Stitch.—The outline stitch is worked from left to right. It is usually ⅛ to ¼ inch long. The needle is put into the material the desired length of the stitch to the right of the starting



OUTLINE STITCH

point and brought out exactly beside the starting point, or slightly ahead. The second stitch is begun the same distance in advance of the first stitch and the needle brought out the same distance from the end of the first stitch, and so on. The thread is kept to the left of the needle toward the outside of the design. The outline stitch is



COUCHING

used to outline designs of various kinds. It may be done in silk, cotton or wool yarns.

Couching Stitch.—Couching is usually made with two kinds of thread. A cord, heavy floss, or several strands of thread, are laid along the design and sewed to the cloth by taking a small stitch with finer thread across the cord at regular intervals. Couching is usually used to outline conventional designs.

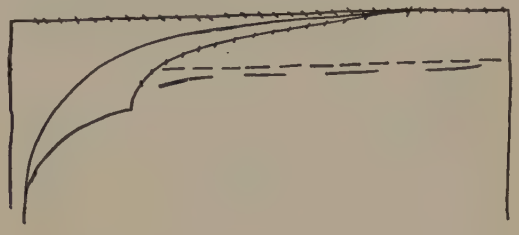
Chain Stitch.—The chain stitch is taken toward the worker. It is begun by bringing the needle

through to the right side of the starting point. For the first stitch the needle is put back into the material at the starting point and brought out the length of the stitch ahead, usually ⅛ to ¼

CHAIN STITCH

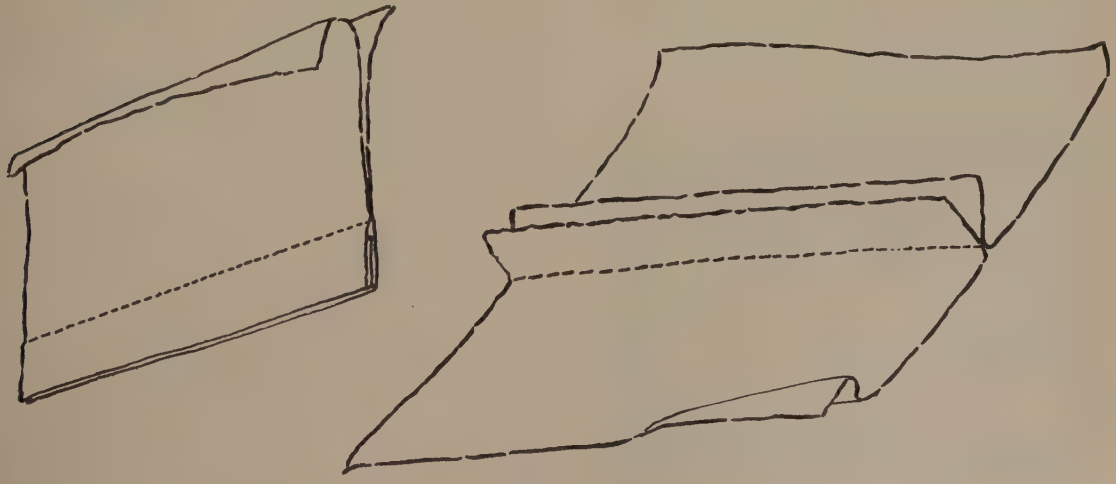
inch. The thread is thrown under the point of the needle from left to right, so as to form a loop as the needle is drawn through. The second stitch is made by placing the needle in the material where it was brought through for the first stitch—inside the loop; the other stitches are made like the first stitch. To end the chain, the needle is placed in the material just outside the loop and drawn through to the wrong side, where it is fastened with several running stitches. The chain stitch is used as an outline for designs to fasten hems, tucks, and the links.

Plain Seam.—The plain seam is made by putting together the two right sides of the piece to be joined, with the edges even, basting and sewing usually about ¼ inch from the edges with the running, the back stitch, the stitching, or the combination stitch. The raw edges may be overcast, together or separately. It is used as a foundation for the most of the other seams.



PLAIN SEAM

French Seams.—The French seam is made by sewing a plain seam on the right side of the garment, with the running stitch trimming the edge usually ⅛ inch from the seam line, creasing the seam out sharply, and turning it so that the two right sides are together. The seam is then basted and sewed a second time, usually with the combination stitch, making the finished seam just wide enough to enclose the raw edges of the first seam. The French seam is sometimes called a double seam. It is a neat, strong, and inconspicuous seam, and is used on undergarments, dresses of light weight materials, infants' garments, and similar articles.



FRENCH SEAM

THE DOLL'S BED

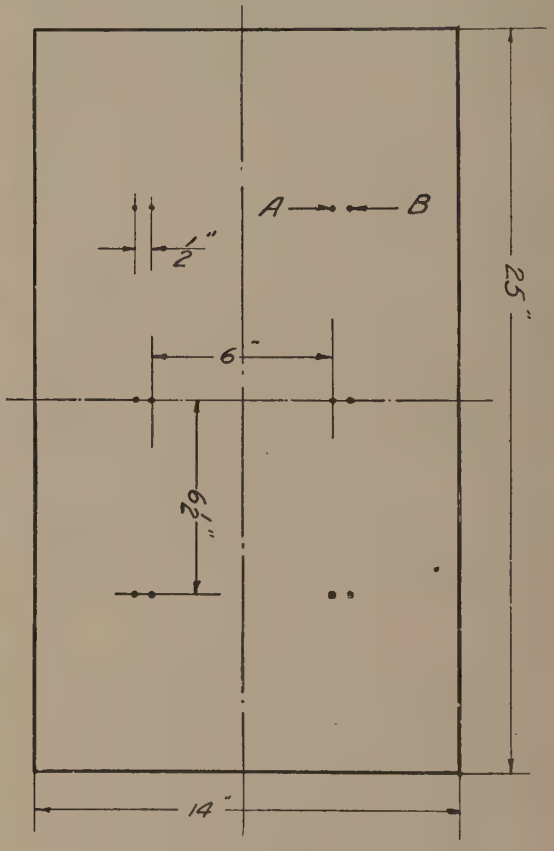
THE first doll's bed shown on this page is 26 inches long and 15 inches wide. It is made for a doll 16 to 20 inches long. The bed in the second picture is made out of a cardboard box and two lids. A box should be used into which the doll and covers will fit easily. There is a picture of another doll's bed, with the directions for making it on page 330. This bed can be made any size to fit any doll. The mattress and covers described are made for the bed 26 inches long and 15 inches wide, but any little girl can change the sizes to fit her own doll's bed.

DOLL'S BED MADE OF BOXES

DOLLY IN HER BED

THE MATTRESS AND PILLOWS

One yard of material 30 inches or more wide is required to make both the mattress and the pillows. Satin, cretonne, art ticking, or plain ticking are suitable materials.

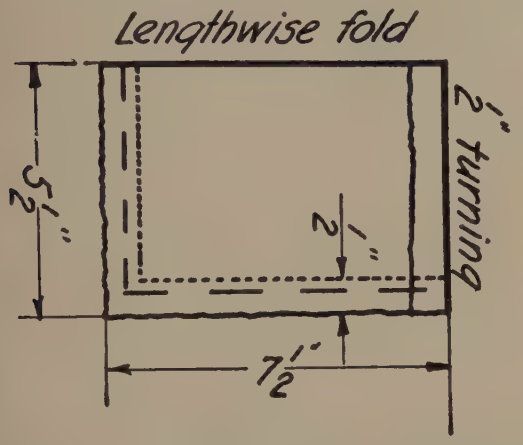


MATTRESS MARKED FOR TUFTING

To Make the Mattress.—Cut a piece of material 26 inches long and 30 inches wide, make a ½-inch turning on the 30-inch end, which is to be left open for stuffing. Fold in half. Baste the two sides and one end. Sew with the running stitch, the combination stitch, the back stitch, or the stitching stitch. The sewing should be very firm and strong, and for this reason the

stitching stitch, or the back stitch, is better than the running stitch, or the combination stitch.

The mattress will be stronger if the seams are stitched on the machine; perhaps mother will help you do this. Then remove the bastings, turn it right side out and mark for tufting, as in diagram. Stuff it with excelsior, cotton, or clean



THE PILLOW

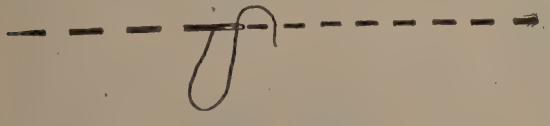
old rags. Sew up the opening with the overhanding stitch, or baste and stitch it on the machine. For tufting, use a carpet needle and a piece of hemp string. Put the needle straight through the mattress at point A; take a stitch ½ inch long, bringing the needle back through point B on the upper side. Tie the string securely and cut, leaving ¼-inch ends.

To make one pillow, a piece of material 7½ inches long and 11 inches wide is required. The two pillows are made as you make the mattress, except that they are not tufted.

STITCHES AND SEAMS USED IN MAKING MATTRESS AND PILLOWS

Plain seam, page 235.
Basting, page 233.

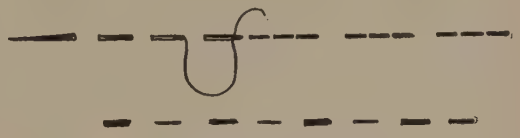
The running stitch is made like even basting, but is very small, as it is a permanent stitch and must be secure. Daintier results are obtained



RUNNING STITCH

when it is begun without a knot, by taking two small stitches from left to right and sewing back over these and catching the end of the thread. It should be ended with several over-and-over stitches, on the wrong side, through one thickness of the material. The running stitch is simple in itself, but is tedious to make and difficult to keep even, unless the proper running motion is used. The needle is placed in the material about ¼ inch from the edge; the edge of the material and the point of the needle are held between the forefinger and the thumb of the right hand, and the thimble finger is placed on the head of the needle. The material is moved back and forth with the left hand as the thimble finger pushes the needle through. The length of the stitch is regulated by the rapidity with which the material is moved back and forth with the left hand and the pressure on the needle by the thimble finger. The needle is left in the material, and, as the work progresses, it is pulled off the eye of the needle. The running stitch is used for seams and sometimes for hems.

The Combination Stitch is a combination of running stitches and back stitches. It may be made in various ways. The one most used consists of two running stitches and a back stitch.

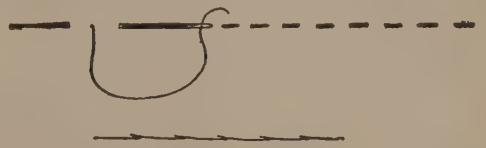


COMBINATION STITCH

UPPER—RIGHT SIDE; LOWER—WRONG SIDE

The right side shows groups of three stitches, the center one of which is a back stitch. The wrong side shows even stitches and spaces, every other stitch being double.

This stitch is stronger than the running stitch but not so strong as the back stitch or the stitching stitch. It is more quickly made than the lat



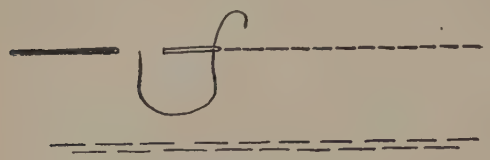
BACK STITCH

RIGHT AND WRONG SIDES

ter, and is often used for the second sewing of the French seam, the first sewing of the fell, and in many other places.

The back stitch has the appearance of the running stitch on the right side, but is made in a

different way. It is very much stronger than the running stitch. It is begun like running, but one stitch is made at a time. The first under-stitch is made twice the length desired, and the second

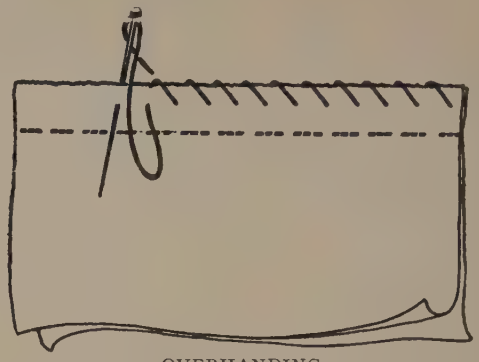


STITCHING STITCH

RIGHT AND WRONG SIDES

stitch is begun half-way back on this space and ended twice the length of the stitch ahead. Each succeeding stitch is made in the same way. It is ended like the running stitch. The back stitch is sometimes called the half-back stitch. It is used on seams that must be strong to withstand a strain.

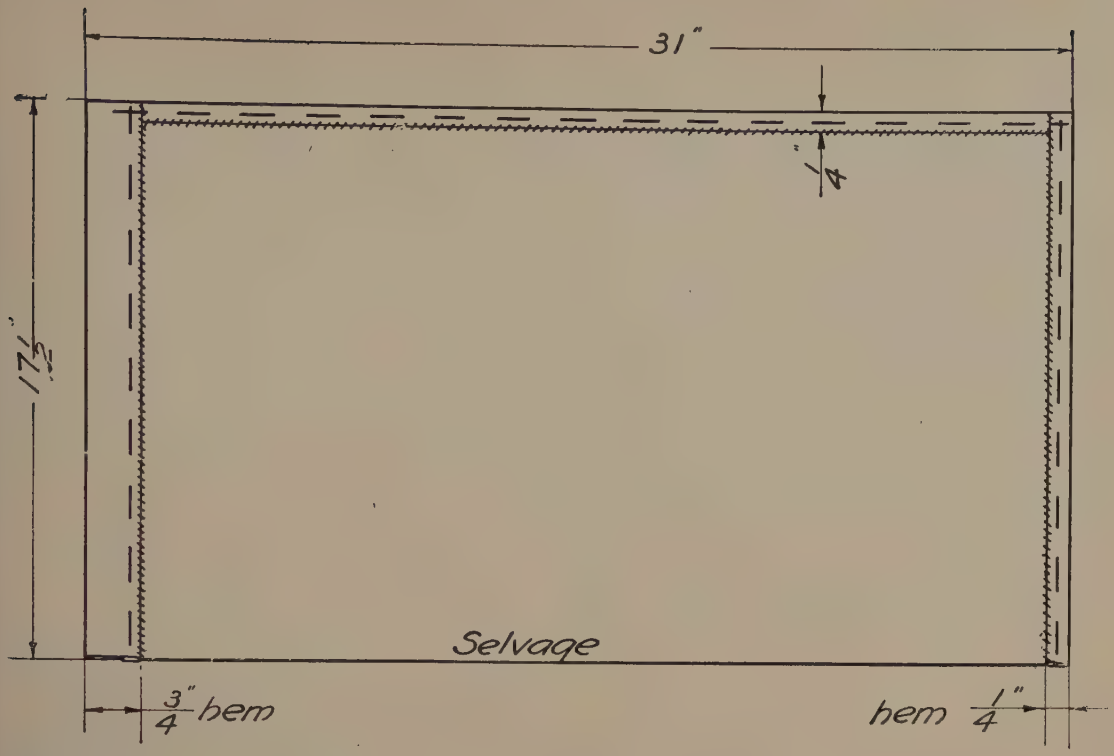
The stitching stitch is so called because it looks like the stitching made on the sewing machine. It is begun like running, but one stitch is made at a time. The first stitch is made the length desired. The second stitch is taken back over



OVERHANDING

this space by placing the needle in the material at the beginning of the first stitch and bringing it out the length of the stitch ahead of the end of the first stitch. Each succeeding stitch is

THE HAND SEWING-MACHINE



THE SHEET

taken back over the space thus made and is ended the length of a stitch ahead, making one continuous line of stitches. It is ended like the running stitch. The stitching stitch is sometimes called the back stitch. It is the strongest of the seam stitches.

Overhanding is a very small over-and-over stitch taken to hold two finished edges together. Two folded edges, lace edges, or selvages are basted together; the stitch is taken from right to left. It is begun without a knot by taking the first stitch in the edge toward the worker and leaving the end of the thread, which is sewed over and held in as the work proceeds. The needle is pointed toward the worker, making a straight stitch on the right side. The stitches should be very fine and very close together, but they should not be drawn too tight or crowded. In order to join the stitch, the end of the old thread through the end farther away from the worker should be left, and the new thread begun as the stitch was begun, sewing over both ends. Overhanding is ended with several over-and-over stitches in the same place, or by overhanding back over several stitches. This stitch is used for piecing, patching, hemming table linen, joining laces, and similar work. It is sometimes made on the right side; for example, when overhanding the ends of bands, and the like. The ends of the mattress and the pillows are overhanded on the right side.

Machine Stitching.—A hand sewing machine is easy for little girls to run, as they do not have to reach the treadle. Mother will also find this kind of machine useful many times.

SHEETS AND PILLOW CASES

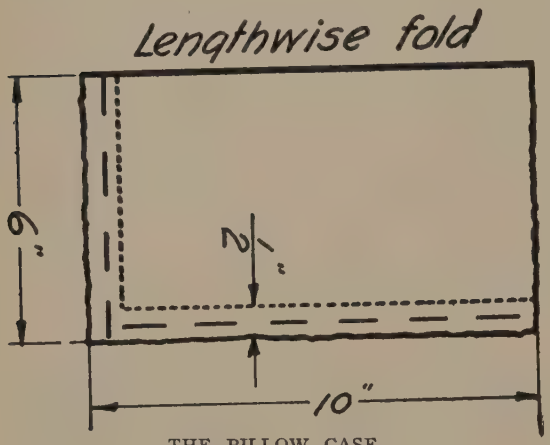
One and one-sixth yards of material 36 inches wide are required to make two sheets and two pillow cases. Muslin, cambric, or longcloth are suitable materials.

To Make the Sheets.—Cut a piece of material 32 inches long and 36 inches wide. Tear this in half lengthwise, for the two sheets. If the material is 36 inches wide, each sheet will have one selvage edge which does not need to be hemmed. Crease a ¼-inch hem on the other side, and on one end. Baste and hem by hand, or stitch on the machine with mother's help. Baste a hem ¾ inch wide on the other end; baste and

hem by hand, or stitch on the machine. This is the top end of the sheet.

TO MAKE THE PILLOW CASES

Use the remaining 10 inches of material for the pillow cases. Cut two pieces 10 inches long and 12 inches wide (two pillow cases can be made from this amount of material). Fold each



THE PILLOW CASE

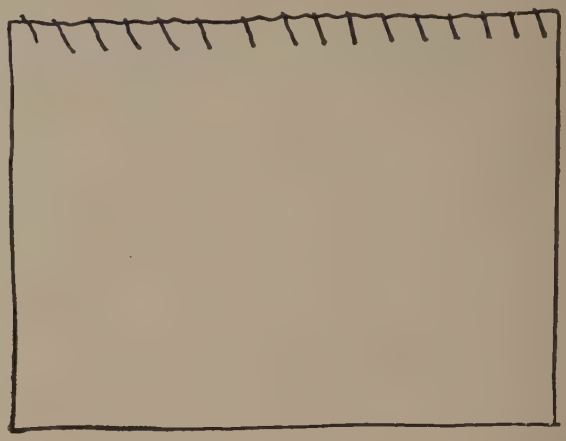
piece and baste one end and side ¼ inch from the end. Sew a plain seam with the back stitch, the stitching stitch, or the combination stitch, or stitch the seam carefully on the machine. If you have basted it very carefully it will be easier to make the final stitching even. Overcast the edges of the seam to prevent raveling. The open end is finished with a hem ¾ inch wide. Baste and sew with hemming stitch, or stitch on the machine.

STITCHES AND SEAMS USED IN MAKING SHEETS AND PILLOW CASES

Basting, page 233.
Back stitch, page 237.
Stitching stitch, page 238.
Combination stitch, page 237.

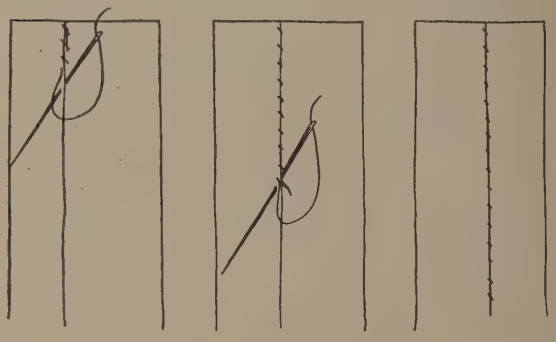
Overcasting Stitch.—Overcasting is a loose, diagonal stitch, usually taken ⅛ inch deep and the stitches ¼ inch apart. It is taken over raw edges to prevent raveling. It is taken from right to left, and may be begun with a knot, or with several running stitches from left to right, and ended with several small back stitches. In order to join the stitch, it should be ended with the running stitches, and the new thread begun in the same manner, as inconspicuously as possible. This stitch is particularly useful as a finish for seam edges.

A *hem* is used to finish a raw edge to prevent its raveling. First the raw edge is turned under



OVERCASTING STITCH

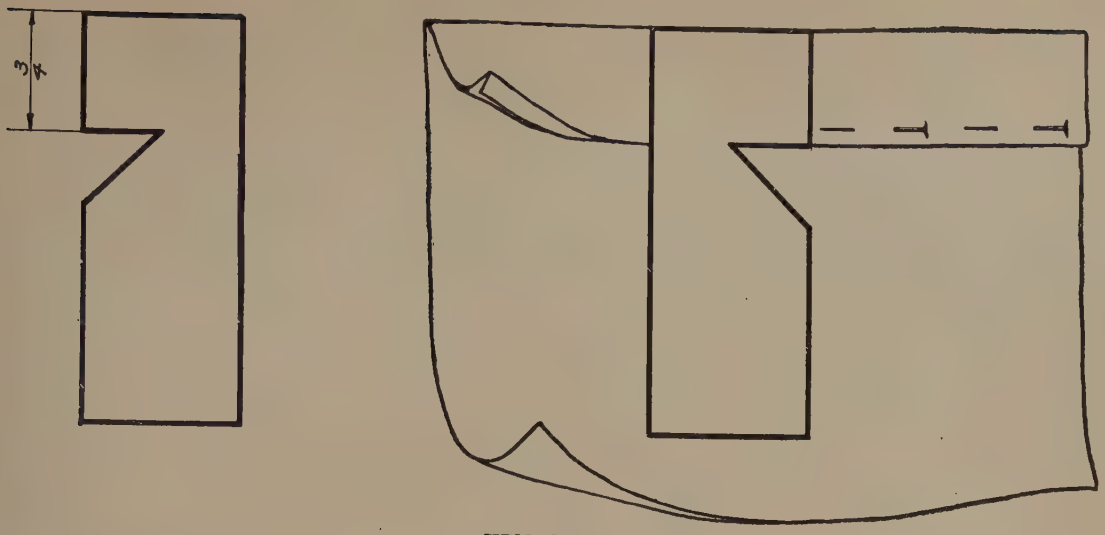
(⅛ or ¼ inch usually). Then a second turning is made as wide as desired from ⅛ inch for handkerchiefs and napkins to 4 or 6 inches for the hem of a skirt. The folded edge is then basted and sewed down with the hemming stitch, machine stitching, or a decorative stitch. It is easier to turn a hem evenly if a hem gauge is



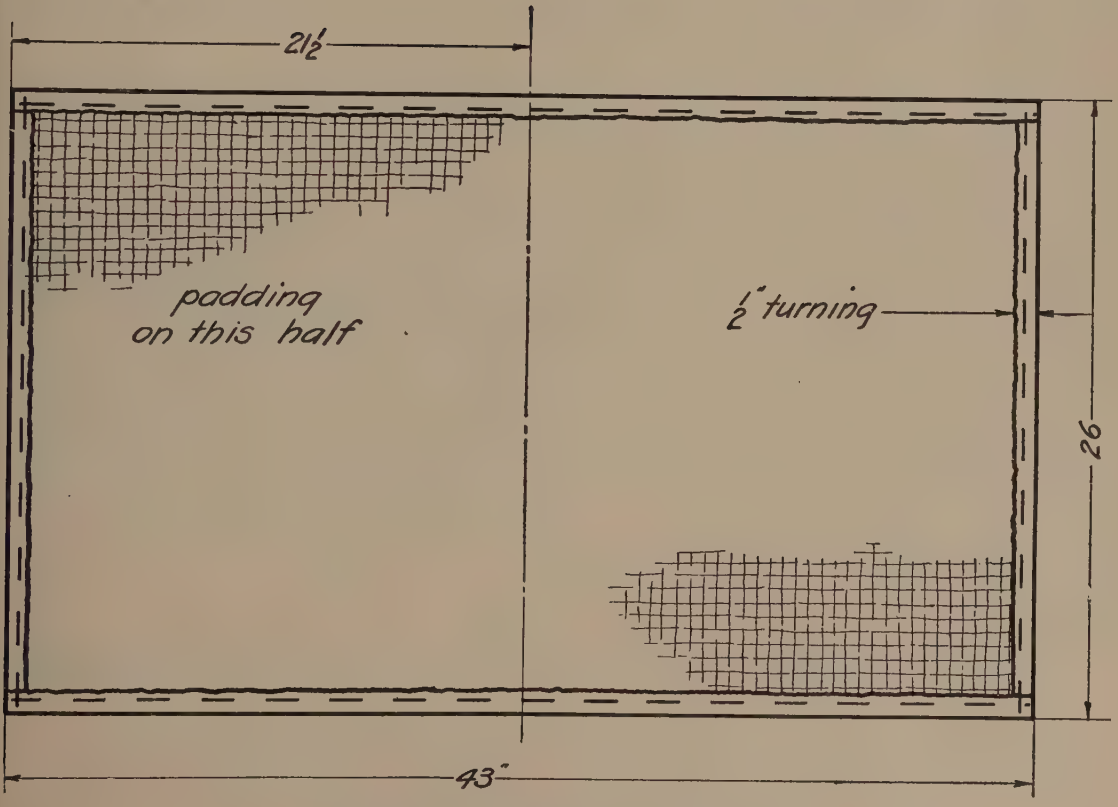
HEMMING

used. This simple measuring device may be made out of a card or a piece of stiff paper about 5 inches long and 1 inch wide. The distance from the end of the gauge to the straight side of the notch is the desired width of the hem. By moving the gauge along the hem as it is turned, the width is kept even.

The hemming stitch is a slanting stitch on both the right and the wrong side of the material. The work is held in a vertical position over the



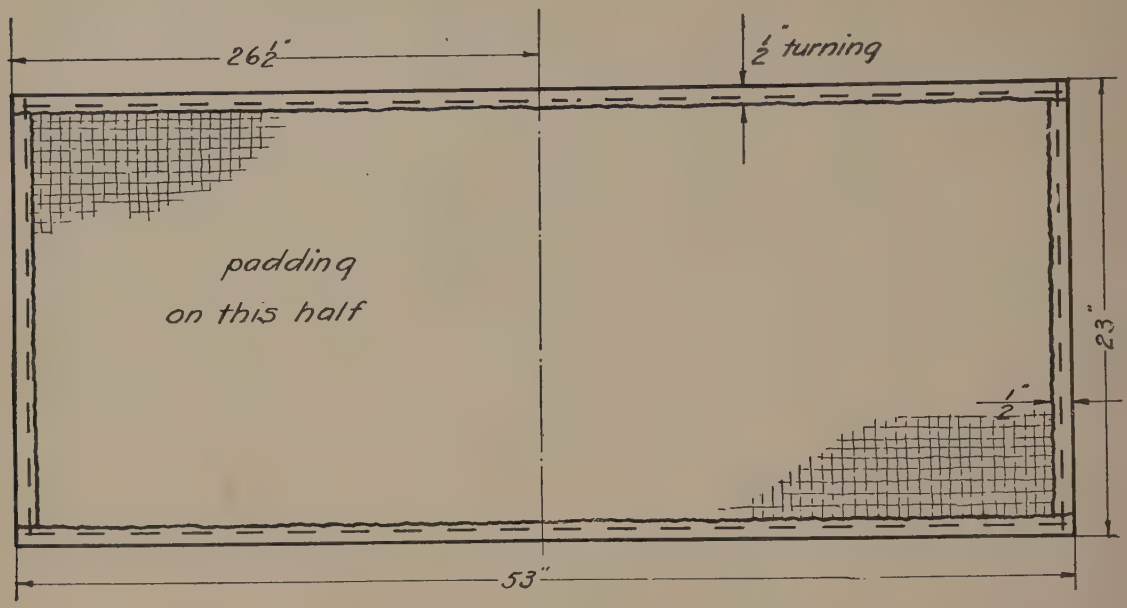
HEM GAUGE



COMFORT CUT FROM 44-INCH MATERIAL

left forefinger, with the hem at the left. The stitching is begun without a knot, by taking the first stitch through the folded edge and concealing the end of the thread within the hem as the work proceeds. The stitch is taken through a few threads of the cloth directly under the edge of the hem, then into the fold of the hem, pointing the needle over the left shoulder. The needle is pointed in the same direction each time in order to make the stitches slant evenly on the right side. Each succeeding stitch is taken slightly in advance of the one before, in order to make the stitch slant evenly on the wrong side.

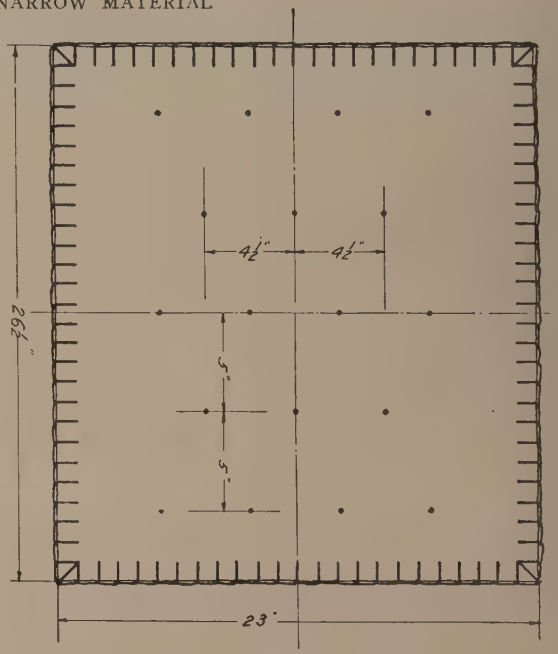
In order to join the stitch, the old thread is ended with the stitch in the cloth, and the new thread begun with a stitch in the fold. Both ends are concealed within the hem and secured as the work proceeds. The hemming stitch is ended with several over-and-over stitches in the fold of the hem. The hemming stitch is used to secure folded or finished edges, such as hems, facings, fells, lace, and the like.



COMFORT CUT FROM NARROW MATERIAL

THE COMFORT

Three-fourths of a yard of material 44 inches wide, or 1½ yard of narrow material, is required for the covering of the comfort. Cotton wadding or batting is used for the padding, and if the covering is made of a thin material, a layer of cheese-cloth should be used to prevent the cotton from coming through the surface. Silkaline, silk mull, lining silk, China silk, or sateen in any dainty color, make pretty comforts. The one in the picture is made of pale pink silk mull. A lining of thin cheese-cloth is used. The



HOW TO TUFT THE COMFORT

blanket stitch and tufting are done with a deeper pink shetland floss.

To Make the Comfort.—If the material is 44 inches wide, cut a piece 44 inches wide and 27 inches long; if a narrower material is used, make the piece 24 inches wide and 54 inches long. Cut the cheese-cloth lining to match. The easiest way to work is to put some newspapers down on the floor to keep the comfort from getting soiled. Lay your material on them, spreading it out straight and smooth. Place the cheese-cloth lining on top of this, and see that it is exactly the same size as the covering material.

Next put the cotton padding on one-half of the piece. This should be a thin layer of cotton. Too much will make the comfort thick and clumsy. Then fold the edge of the material and lining over the padding about ½ inch, pinning it into place, and baste the ½ inch, turning all the way around the covering. Now fold the unpadded half of the covering over the padded half, bringing the edges even. Baste around the four sides. The comfort is now ready for the blanket stitch. Use a light-weight wool yarn and a long-eyed needle. Take the stitches ⅜ inch deep and ½ inch apart.

To Tuft the Comfort.—Find the center of the comfort and measure 2¼ inches on each side, and mark with a pin for the first tufting. Place the other tufts as shown in the diagram, marking each with a pin. With the same needle and yarn used to blanket stitch the edge, take a stitch ⅛ inch long at each pin, being careful to catch in the wrong side of the comfort. Tie in four 1-inch lengths of yarn on the right side, and cut the ends even, making ten ends in each tufting.

STITCHES USED IN MAKING THE COMFORT

Basting, page 233.
Blanket stitch, page 233.

THE BABY DOLL

The baby doll in the pictures is 16 inches long. You can make the clothes for her by studying the pictures and diagrams, and following the directions very carefully. Perhaps mother will help you to make them larger or smaller, if necessary, to fit your own doll.

DOLLY WHEN SHE IS DRESSED

THE DIAPER

Use a piece of bird's-eye toweling 12 inches by 20, or 15 inches by 15. Baste a hem a ¼ inch wide on all four sides, unless there is one selvage edge, which does not need to be hemmed.

STITCHES USED IN MAKING THE DIAPER

Basting, page 233.
Hemming, page 240.
Running, page 237.
Hem, page 240.

THE SHIRT

The doll's shirt may be made out of the top of an old white stocking, or the lower part of the leg or sleeve of a knitted undergarment. Cut a piece 7 inches long (shorter if the doll is less than 16 inches long) from the top of the stocking. The seam should come on one side under the arm. Cut the arm-holes and neck as shown in the diagram; make a tiny hem around the arm-holes and a hem around the neck wide enough to run a cord through, to draw it up. The hemming stitch or running stitch may be used.

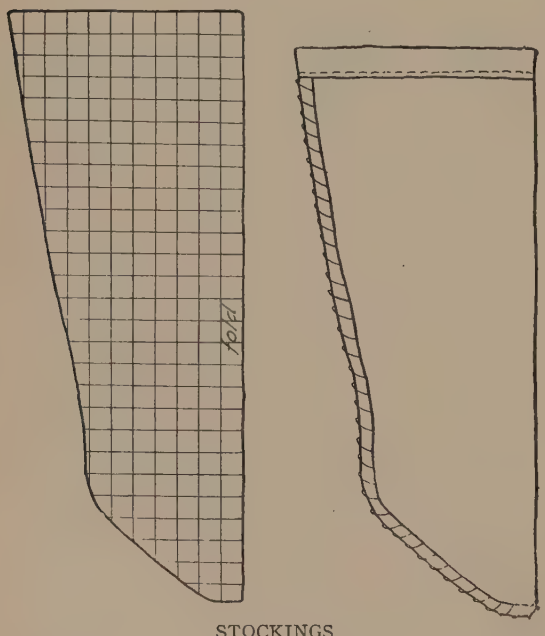
STITCHES USED IN MAKING THE SHIRT

Hem, page 240.
Running, page 237.
Hemming, page 240.

THE SHIRT

THE STOCKINGS

The stockings may be made out of the part of the white stocking which is left after cutting the shirt. To make the pattern rule a piece of paper



STOCKINGS

in ¼-inch squares and copy the diagram given above. This will give you the outline of the stocking. Cut out this pattern and cut the stockings by it. Sew the seam with the running stitch, then sew over and over the raw edges, as shown in diagram, to prevent raveling. Make a ¼-inch hem around the top of the stocking and sew with the running or hemming stitch. Be careful not to draw the thread too tight, or it will break when the stocking is stretched as it is put on the doll.

STITCHES USED IN MAKING THE STOCKINGS

Running, page 237.
Hemming, page 240.

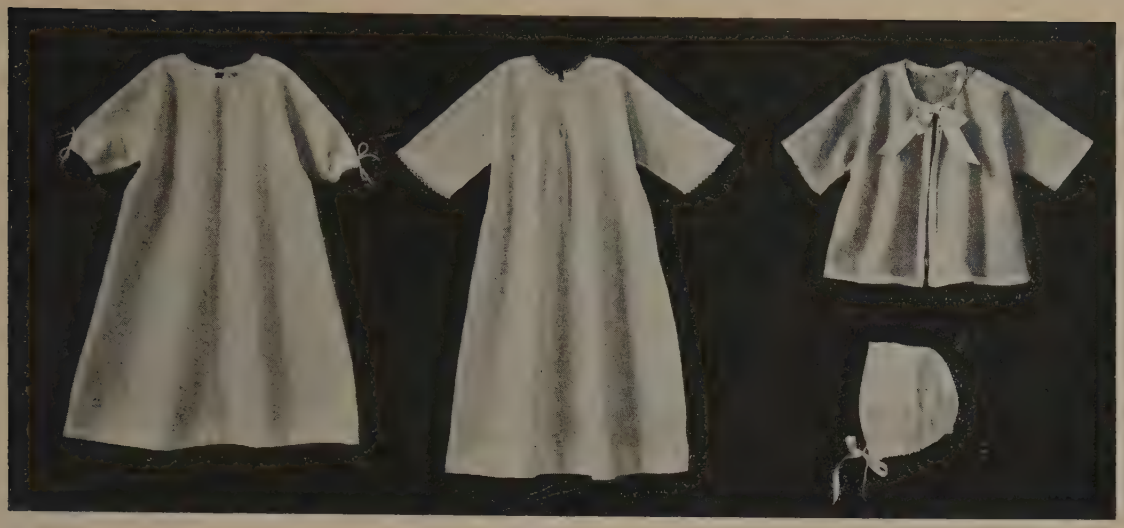
THE NIGHTGOWN, THE SIMPLE KIMONO DRESS, AND THE SACK*

Decide which size of pattern will fit your doll, then lay a piece of tissue paper or a piece of an old pattern over the diagram, and trace the outline of the nightgown or the dress. Trace a separate pattern for the sack. Cut out the pattern on these lines.

One yarn of outing flannel 16 inches wide will make the nightgown without piecing. One-half yard of outing flannel 30 to 36 inches wide will make the gown by piecing it on the shoulders. Part of an old flannel gown or petticoat may be used, as well as new material. If the gown is to be cut without piecing, fold the material first lengthwise, then crosswise, and pin the pattern on with the center front and back on the lengthwise folds and the shoulder on the crosswise folds (see diagram). When pieced, the shoulder is cut on the crosswise edge of the material.

Cut carefully around the edges of the pattern. The dotted line shows the front neck lower than the back neck line; mark this, and cut the front neck line after taking off the pattern. Cut the placket 5 inches long, measuring down from the neck line on the center back fold. Fold the gown across the shoulders and sew the back and front together with French seams or hemmed fells. Begin at the bottom of the sleeves and continue to the bottom of the gown. Make a ¼-inch hem on each side of the opening for the placket, fold the right side over the left at the base, and sew firmly with the stitching stitch. Pin and baste a 1-inch hem on the bottom of the gown, and finish with the running stitch or the hemming stitch. Baste a ¼-inch hem around the neck and on the

* These designs are printed in actual size and enclosed in the box with these books.



SLIP, DRESS, SACK, AND BONNET

bottom of the sleeves of the gown, and finish with the running stitch or the hemming stitch, leaving ½ inch unsewed on the sleeves, in order to run in a tape to draw up the sleeves when the night-gown is on the doll. A tape should also be run through the hem at the neck.

STITCHES AND SEAMS USED ON THE NIGHTGOWN

Basting, page 233.
Running, page 237.
Hemming, page 240.
French seam, page 235.
Combination stitch, page 237.
Back stitch, page 237.
Stitching stitch, page 238.

Hemmed Fell.—The hemmed fell is made by sewing a plain seam on the wrong side of the garment with the running, the combination, the back stitch, or the stitching stitch, according to the strength desired. The under edge of the seam is trimmed to ⅛ inch, the wider edge is turned over the narrow one, and the seam basted flat to the material. The folded edge is sewed down to the material with the hemming stitch. The hemmed fell is smooth and flat, and is used on undergarments, infants' garments, and in places where the smoothest finish possible is desired.

FLANNEL PETTICOAT

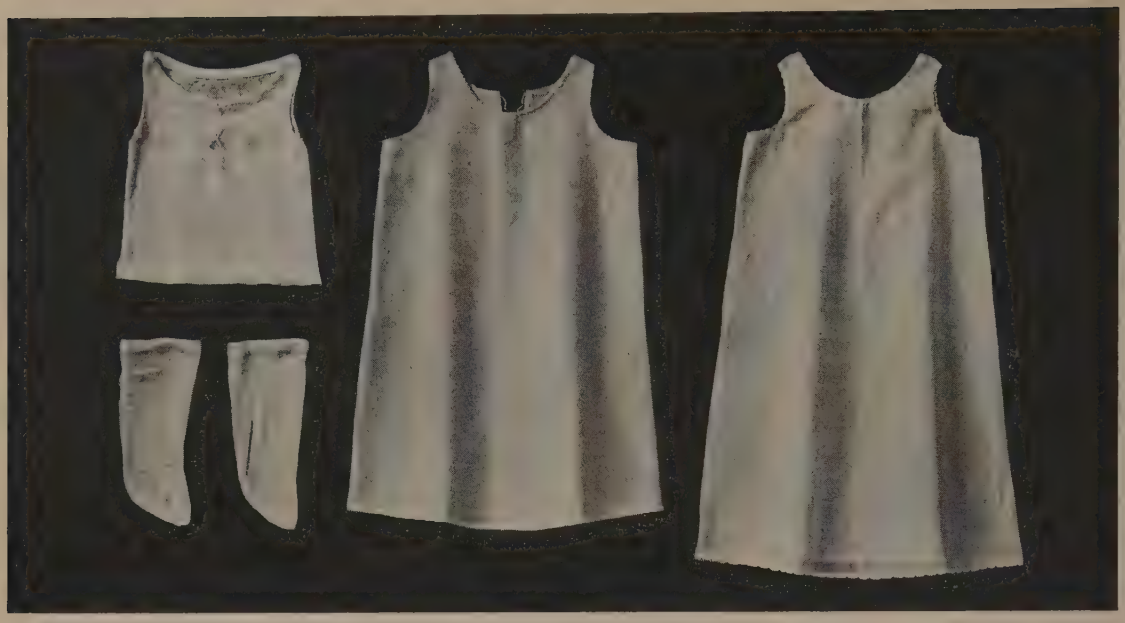
Take a piece of paper and lay it out in 1-inch squares. Each one of these larger squares is the same as the smaller square on the diagram herewith. Copy this pattern, square by square; then cut out your diagram and you have the pattern for dolly's petticoat.

To Make the Flannel Petticoat.—One-half yard of flannel is required to make the petticoat. It

HEMMED FELL

can also be made out of a worn-out petticoat of baby brother's or your own.

To Cut the Front.—Fold one edge of the flannel over just the width of the bottom of the pattern and pin the front pattern on the material length-

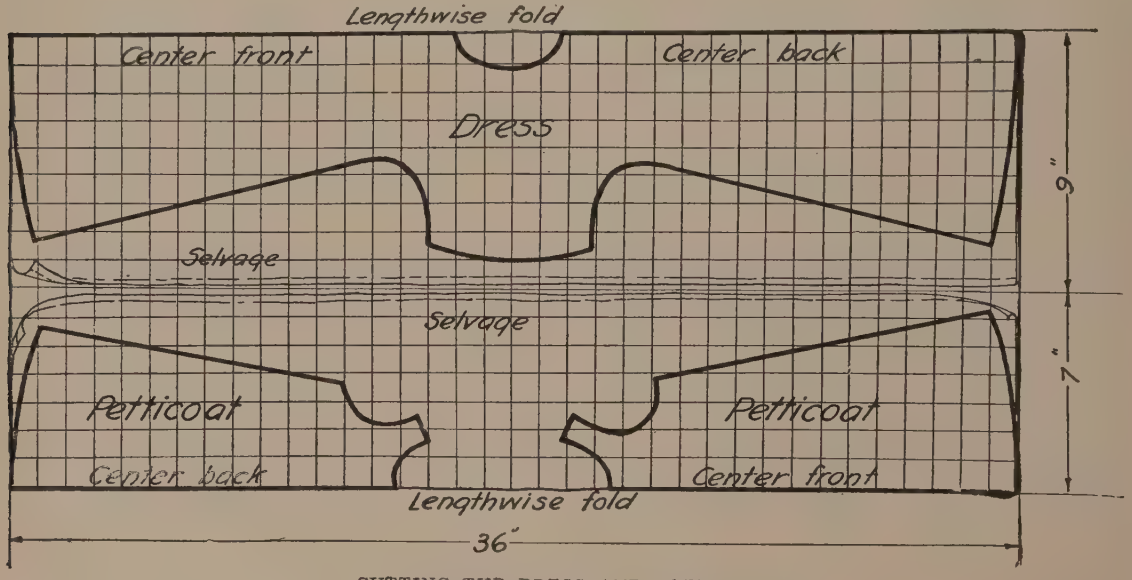


SHIRT, STOCKINGS, AND PETTICOAT

wise, with the center front on the fold, as shown in the diagram. Cut around the edge of the pattern very carefully.

To Cut the Back.—Fold the other edge of the material over; pin the back pattern on the lengthwise fold, as shown in the diagram, and cut around the edge of the pattern very carefully.

To Make the Seams.—Baste the underarm seams of the petticoat ¼ inch from the edge, sewing the back and the front together. Baste the shoulder seams ¼ inch from the edge (see diagram). Sew these four seams with white silk thread, using the running stitch or the combination stitch. Trim one edge of the seam narrower

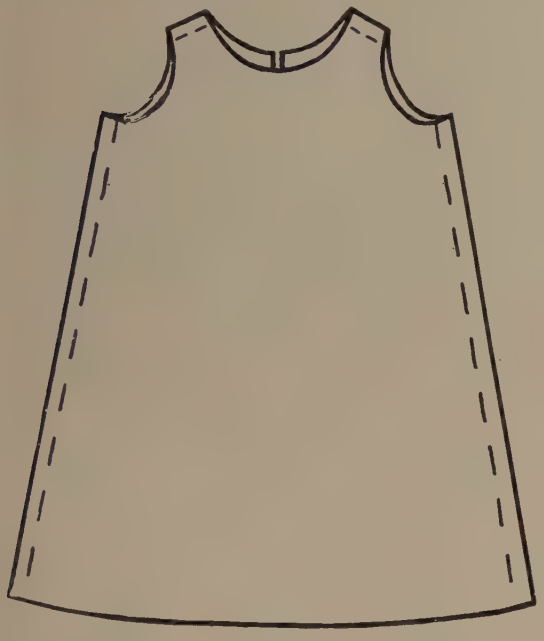


CUTTING THE DRESS AND PETTICOAT

EACH SQUARE EQUALS ONE INCH

than the other, lay the wider edge flat over the narrower edge, and baste to the petticoat. Sew this with the catch stitch, making a flannel fell.

To Finish the Edges.—Cut the placket 5 inches long, measuring down from the neck on the center back line. Make a ⅛-inch turning to the



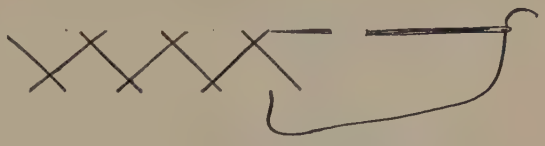
SEWING THE SEAMS OF PETTICOAT

wrong side on the placket, the arm-holes, the neck, and the bottom, and baste with ⅛ to ¼ inch stitches. Blanket stitch over this folded edge, taking the stitches ⅛ inch deep and about the same distance apart. Run a cord or bobbin tape in the neck of the petticoat, leaving ends 3 inches long to tie.

STITCHES AND SEAMS USED IN MAKING THE FLANNEL PETTICOAT

Basting, page 233.
Running, page 237.
Combination, page 237.
Blanket, page 233.

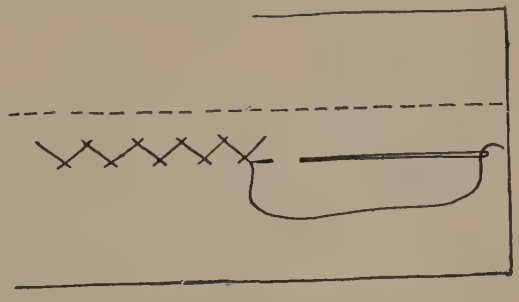
The Catch Stitch is made from left to right between two imaginary horizontal lines. The needle is brought through at the left end of the upper line, and the first stitch is taken from right to left on the lower line far enough to the right of the starting point to make the resulting stitch slant. The next stitch is taken in the same manner on the upper line, making the threads cross and slant in such a way that the stitch taken on one line is opposite the space between the stitches



THE CATCH STITCH

on the other line. This stitch is used as a decoration and for securing the raw edges of seams, hems, and the like, in flannel and in some other materials.

Flannel Fell.—To make a flannel fell, a plain seam is first made on the wrong side of the garment, using the combination stitch, or the back



FLANNEL HEM

stitch. One edge of the seam is trimmed narrower than the other, and the wider edge is laid flat against the garment covering the narrower edge. Care should be taken to keep the seam open, flat, and smooth on the right side. The catch stitch is taken over the raw edge fastening it to the garment. When working with flannel, as few turnings as possible should be used, as they make the garment clumsy and thick.

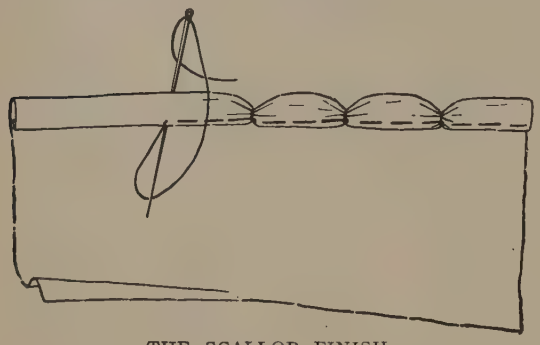
WHITE PETTICOAT

One-half yard of nainsook, muslin, longcloth or cambric is required for the white petticoat. One yard will make both the petticoat and the dress. When the petticoat and the dress are made out of the same material, both can be cut to greater advantage (see chart).

To Cut the White Petticoat.—Cut the white petticoat one inch longer than the flannel petticoat; otherwise cut it the same way when one-half yard of material is used.

To Make the Seams.—Join the front and the back with French seams ⅛ inch wide under arms and on shoulders.

To Make the Placket.—Cut the placket 5 inches long, measuring down from the neck on the center back line. Make a ⅛-inch hem on



THE SCALLOP FINISH

each side of the opening, fold the right side over the left at the base of the placket, making a little pleat. Sew this firmly with the stitching stitch.

To Finish the Edges.—Crease a hem ⅛ inch wide on neck, arm-holes, and bottom of petticoat; begin the stitch on the bottom, as it is harder to make it well on the curve around

DOLLY PARTLY DRESSED

edges of the neck and arm-holes. Take three running stitches to hold the edge of the hem, then take one blanket stitch over the whole hem; drawing it up tight to pull the edge of the hem into a scallop. Next, take three more running stitches, then a blanket stitch, and so on to the end.

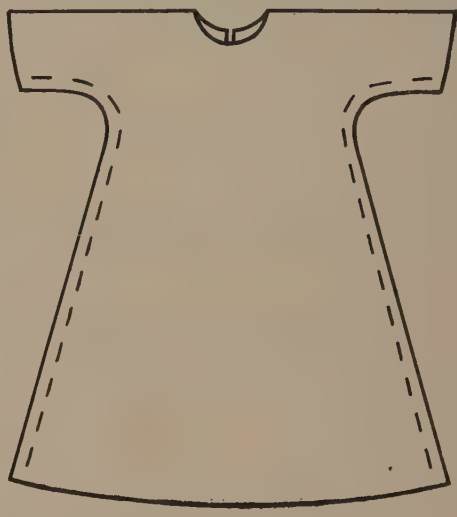
Sew a narrow tape 3 inches long on each side of the placket at the neck to fasten the petticoat in the back.

STITCHES AND SEAMS USED ON THE WHITE PETTICOAT

Basting, page 233.
Running, page 237.
Combination, page 237.
French seam, page 235.
Blanket stitch, page 233.
Hem, page 240.

THE DRESS

One yard of nainsook, batiste or dimity will cut both the white petticoat and the simple kimono dress. Two-thirds of a yard of narrow lace is used on the neck and the sleeves of the dress. The same pattern is used for the dress that was used for the nightgown. Pin the pattern on the material with the center front and the center back on the lengthwise folds and the top of the shoulder on the crosswise folds (see



SEWING THE SEAMS OF THE DRESS

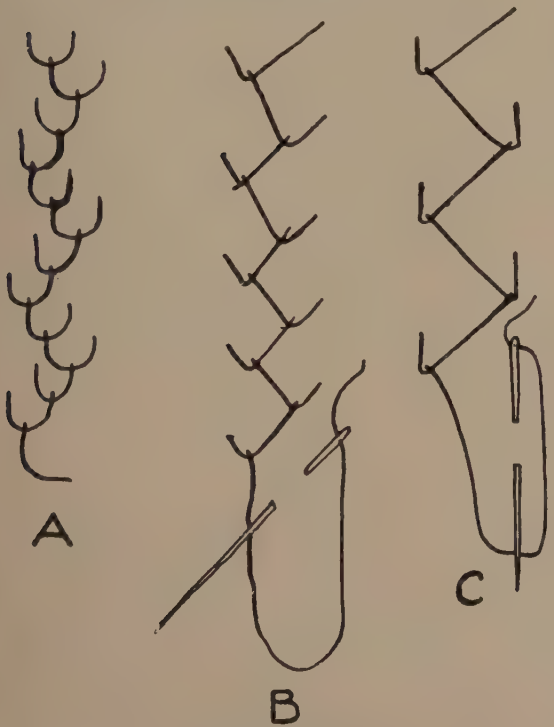
diagram, page 245). The dress is cut all in one piece. One-half yard of material will cut the dress by piecing it on the shoulders with a French seam. Cut carefully around the pattern. The dotted line shows the front neck line a little lower than the back. Mark this and cut the front neck line after taking off the pattern. Cut the placket 5 inches long, measuring down from neck line on the center back fold.

To Make the Dress.—Fold the dress across the shoulders and sew the back and the front together with French seams ⅛ inch wide. Begin at the bottom of the sleeves and continue to

the bottom of the skirt. Make the placket as in the white petticoat. Baste a ¾-inch hem on the bottom of the skirt, and finish with the chain stitch, or the feather stitch. Sew the tiny lace edge on the bottom of the sleeves and around the neck. If you want to make the dress a little prettier, make six tiny hand-run tucks 1¼ inch long, in groups of two tucks ¼ inch apart; make the groups ¾ inch apart. Then make a line of chain stitching or feather stitching in the space between the groups of tucks (see the picture of the dress). Do this before sewing on the lace. Hand tucks are hard for little girls to make, and the dress is very pretty without them. Sew a narrow tape or ribbon 3 inches long on each side of the opening at the neck to fasten the dress in the back. Tie a narrow tape or ribbon around the bottom of the sleeve at the wrist, after putting it on the doll.

STITCHES AND SEAMS USED ON THE DRESS

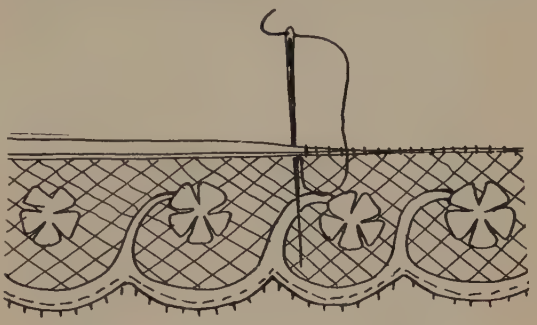
Basting, page 233.
Running, page 237.
Combination stitch, page 237.
Chain stitch, page 235.



FEATHER STITCH

A—SINGLE B—DOUBLE C—CORAL

The feather stitch, or *briar stitch,* is a series of blanket stitches taken on either side of a main stem, making a stitch with a vinelike appearance. It proceeds toward the worker. Practice is required to keep the stitches and the spaces even and regular. There are many variations of the feather stitch in the number of stitches taken on each side of the vine and in the direction in which these stitches are taken. The feather stitch is used to secure hems, tucks, and the like, and as a decoration for underwear, infants' garments, collars, and similar articles.



SEWING ON LACE—FIRST METHOD

SECOND METHOD OF SEWING ON LACE

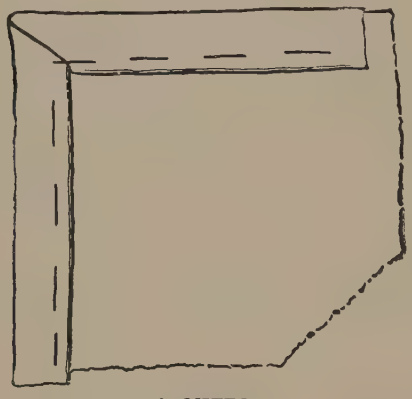
Sewing on Lace (first method).—Lace or beading may be sewed to material by holding or basting it about ⅛ inch from the raw edge and whipping over the edge and through the lace, letting the thread draw the material down tight and firm. The stitches are taken close together and drawn tight. Two raw edges of material may be whipped together in this way, also.

Sewing on Lace (second method).—The lace may be sewed to the raw edge in a ⅛-inch seam on the right side, letting the edge of the lace extend a little beyond the edge of the material. The seam is then creased flat, as for a felled seam, and the edge of the lace is sewed down with the running or hemming stitch.

THE SACK

A piece of material 16 by 9 inches is required for the sack. Cashmere, albatross, flannel, or challis in white or light pink or blue make pretty sacks. Perhaps mother has some left-over pieces that you can use. Two and one-half yards of ribbon 1 inch wide are needed to finish the edges and the neck.

The same pattern is used for the sack as for the nightgown and the dress, except that it is



A MITER

cut shorter—on the dotted line shown on the pattern. Lay a piece of tissue paper or a piece of an old pattern over the diagram and trace the outline of the sack. Cut out the pattern on these lines. Fold the material lengthwise and crosswise as you did for the nightgown. Pin the pattern on carefully, and cut the sack.

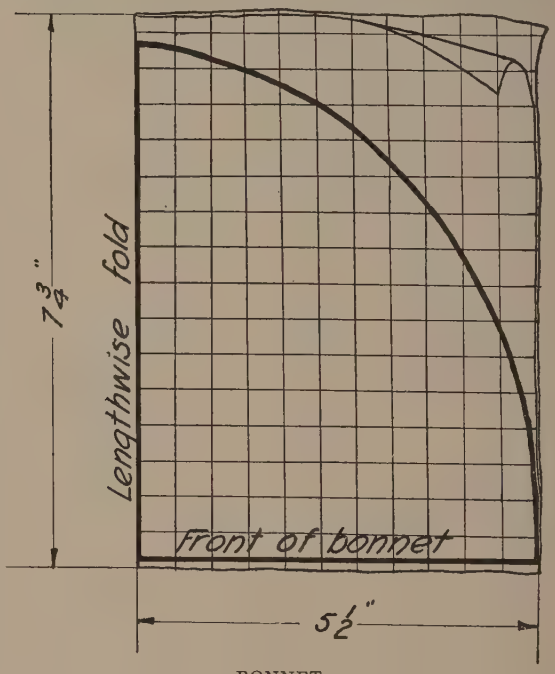
To Make the Sack.—Fold the sack across the shoulders and make French seams ¼ inch wide or flannel fell from the bottom of the sleeves to the bottom of the sack. Fold the ribbon in the center and press it with an iron. Then slip the edge of the sack into the folded ribbon, beginning on one side of the center front at the neck and baste it carefully around the edge and back to the neck. Fold the ribbon at the corners to make a diagonal seam called a miter, on both sides. Baste the ribbon around the bottom of the sleeves in the same way, beginning at the seam and ending by turning in the end of the ribbon about ¼ inch to make it neat, and lapping it over the beginning end. Baste the ribbon that you have left around the neck of the sack, leaving the ends to tie in front. Sew the ribbon on with the feather stitch or chain stitch, and take out the bastings. Use a hard twisted knitting or crocheting silk for the fancy stitch, the same color as the ribbon, or a harmonizing color.

STITCHES AND SEAMS USED ON THE SACK

Basting, page 233.
Chain stitch, page 235.
Feather stitch, page 249.
French seam, page 235.

THE BONNET

A piece of fine white material 11 by 7¾ inches is needed to make the bonnet. Mark off a piece of paper in ½-inch squares and draw the outline, square by square, as given in the drawing herewith. Cut out the pattern on this line. Fold the material and pin the pattern on as shown in the diagram. Cut carefully around the pattern.



BONNET

EACH SQUARE EQUALS ½ INCH

Baste a hem ½ inch wide on the front edge of the bonnet. Finish this with a fancy stitch made with white crochet cotton, or pink or blue floss. Next baste a hem ⅜ inch wide around the curved edge of the bonnet; sew this with the running stitch, or hemming stitch, or stitch it on the machine. Run a ribbon ½ yard long through this hem, gathering the bonnet up to fit around the neck of the doll. Sew the remaining ends of the ribbon on the bonnet for ties.

STITCHES USED ON THE BONNET

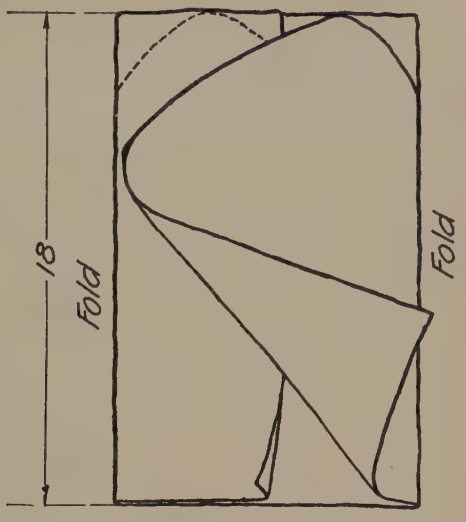
Running, page 237.
Hemming, page 240
Feather stitch, page 249.
Chain stitch, page 235.

THE OUT-OF-DOORS GARMENT

One-half yard of single-faced eiderdown is needed for this out-of-doors garment. For the coat part, use a piece 18 inches long and 28

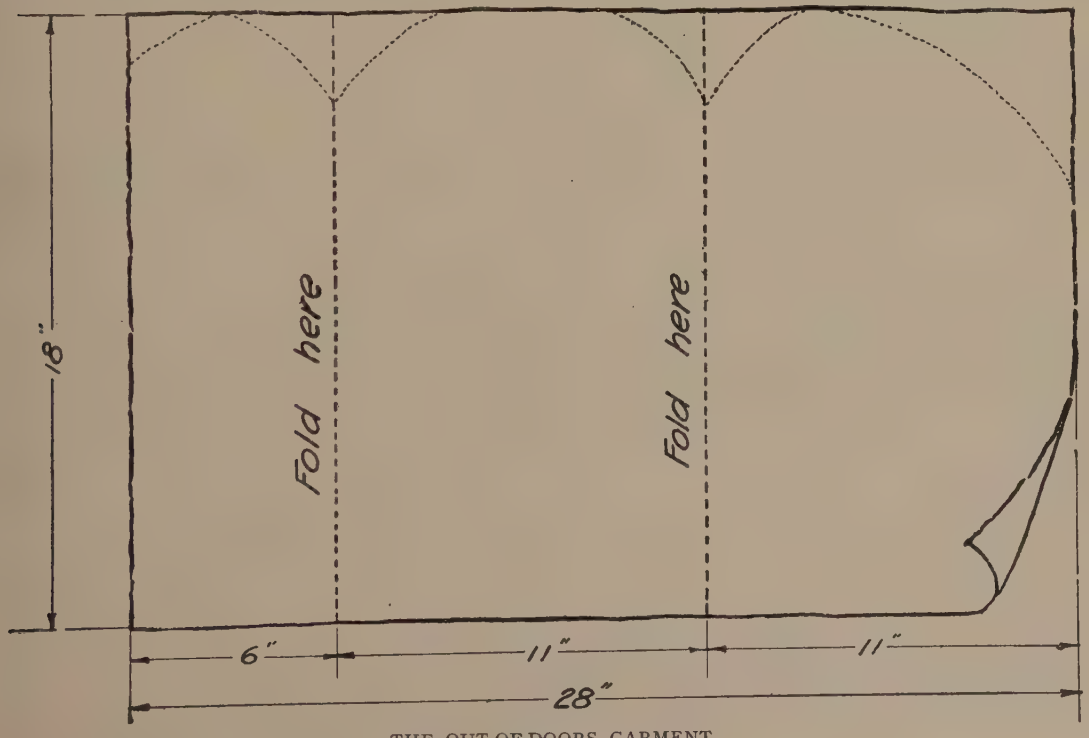
OUT-OF-DOORS GARMENT

inches wide, leaving the remaining 10 inches for the hood. Three and three-quarter yards of ribbon 1¼ inch wide are needed for binding the edges and making the bows. Fold the material on the lines shown in diagram A, bringing the edges into the position shown in diagram B. Cut the shoulders and the front part of the neck as shown in diagram B. This makes the coat fit close around the doll's neck.



OUT-OF-DOORS GARMENT
DIAGRAM B

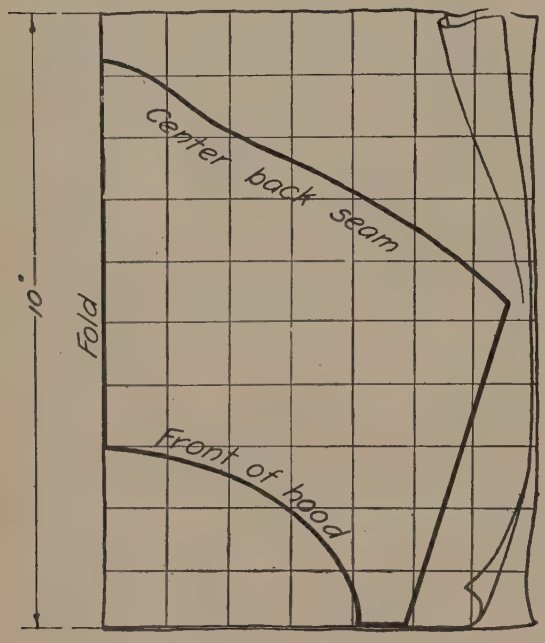
To Cut the Hood.—Make the pattern for the hood by laying out a piece of paper in 1-inch



THE OUT-OF-DOORS GARMENT
DIAGRAM A

squares and copying the diagram of the hood. Cut it carefully on the outside line. Fold the material which you have left, which is about 10 by 18 inches, and pin the pattern on as shown in the diagram. Cut out the hood, following the edge of the pattern very carefully.

To Make the Out-of-doors Garment.—Fold the hood and the coat with the right side inside, so that the seams will be on the wrong side of the material when it is finished. The soft, fuzzy side



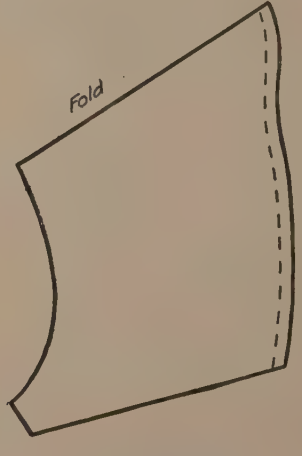
HOOD

EACH SQUARE EQUALS ONE INCH

SEWING THE SEAMS IN THE OUT-OF-DOORS GARMENT

of eiderdown is the right side. Sew the center back seam of the hood and the shoulder seams of the coat with the back stitch, using strong thread, about No. 40. Make the seams ½ inch wide. The hood will be nicer on the inside if the back seam is opened flat and a piece of ribbon feather-stitched, chain-stitched, or catch-stitched over it. Next fold the ribbon in the center, and press in the crease, as you did for the sack. Slip the edges of the coat and hood into the ribbon, pin carefully, then baste. Use a hard twisted knitting or crocheting silk, the same color as the ribbon, or a harmonizing color, for the fancy stitches.

Sew the ribbon on the center front edge of the coat first, ending at the neck; then on the

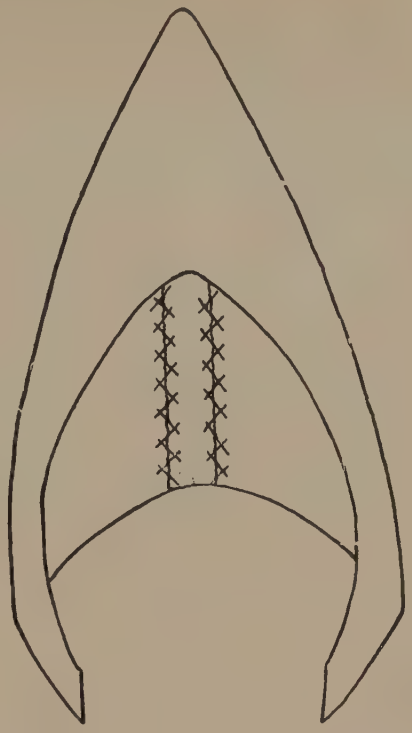


SEWING THE HOOD OF THE OUT-OF-DOORS GARMENT

edge which fastens at the side, beginning at the bottom and ending in the center front of the neck. Next sew a piece of ribbon 24 inches long around the neck, leaving the ends to tie. Now sew on ribbon around the front of the hood, then the bottom. Feather stitch the ribbon on the bottom of the hood on the inside, because this edge slips inside the neck of the coat and only shows on the inside. When the fancy stitch is finished, sew the bottom of the hood to the neck of the coat, lapping them so that only the ribbon binding on the coat shows on the outside. Sew this, so that the stitches show as little as possible. Now fold the garment wrong side out, and sew the seam at the bottom. When turned right side out, the coat should fasten at one side. Cut four pieces of ribbon 8 inches long and sew them to the coat, as shown in the picture. These and the ribbons at the neck are used to fasten the out-of-doors garment after it is put on the doll.

STITCHES USED ON THE OUT-OF-DOORS GARMENT

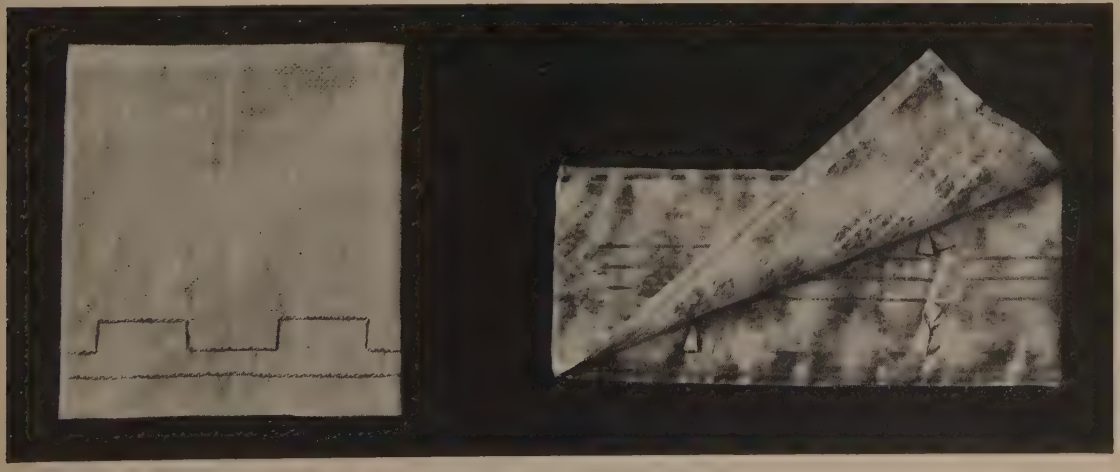
Back stitch, page 237.
Catch stitch, page 247.
Feather stitch, page 249.
Chain stitch, page 235.



MAKING A FLAT SEAM IN BONNET

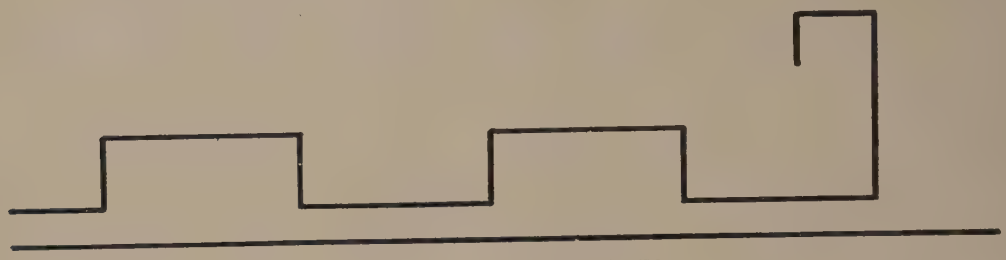
GIFTS

WHAT little girl does not enjoy making pretty and useful gifts for her mother and father and others she loves? Especially at Christmas time, when the spirit of good-will is felt everywhere, does she become filled with a desire to do her part. How much pleasure there is in helping to celebrate a birthday by giving something made with one's own hands!



TOWEL AND GLOVE CASE

The gifts pictured on this and other pages are useful, attractive, and easily made. Care must be taken, however, to keep the dainty materials clean and fresh while working on them. It is a good plan to have a covered box to keep them in, to wear a fresh apron, and to be sure the hands are clean when one sits down to sew.



DESIGN FOR GUEST TOWEL

GIFTS FOR MOTHER

Guest Towel

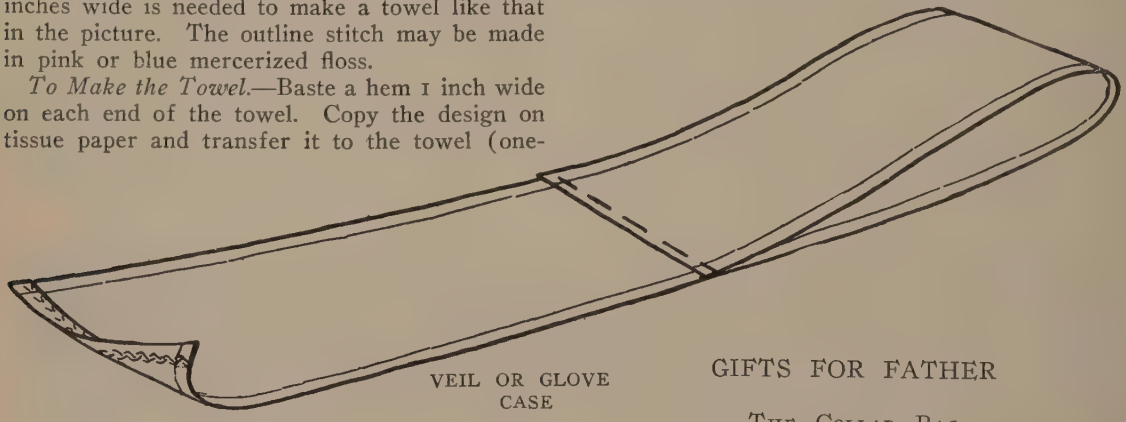
A pair of guest towels decorated with the outline stitch is a gift much appreciated by mothers. Three-quarters of a yard of linen huckaback 15 inches wide is needed to make a towel like that in the picture. The outline stitch may be made in pink or blue mercerized floss.

To Make the Towel.—Baste a hem 1 inch wide on each end of the towel. Copy the design on tissue paper and transfer it to the towel (one-half of the design is given), or draw a simple design of your own just above the hem. The bottom line of outline stitches should fasten down the edge of the hem. Make the stitches close and even.

Veil or Glove Case

Mother will find this dainty case convenient to hold her best veil or her white gloves. One yard of ribbon 5 inches wide is needed for the case, 20 inches of baby ribbon for the tufting, a little knitting silk for the feather stitching, and some cotton and sachet powder for the padding.

To Make the Case.—Baste a hem ¼ inch wide on one end of the ribbon and feather-stitch it on the right side. Make a ¼-inch turning on the other end, fold the ribbon, and baste the folded end flat to the ribbon. Feather-stitch this on the outside. Next fold the hemmed end over, making three thicknesses 12 inches long. Overhand the three edges together on one side. Put a little sachet powder between two layers of cotton, and place the padding in the two little envelopes formed by the two thicknesses of the ribbon. Overhand these two edges to enclose the padding. Four tuftings are made with baby ribbon and a large needle. Tie the ribbon in tiny bows as shown in the picture.



VEIL OR GLOVE CASE

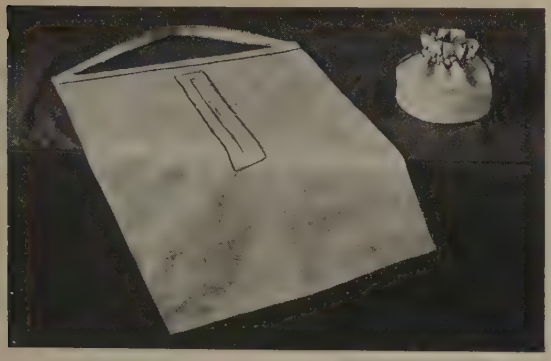
GIFTS FOR FATHER

The Collar Bag

Father will find that this collar bag will keep his collars clean and fresh. It will be convenient for him to carry them in when he goes traveling. Fifteen inches of natural colored firm linen crash 32 or 36 inches wide is needed to make a collar bag like the one in the picture. Brown unmercerized floss is used for the cord and fancy stitch.

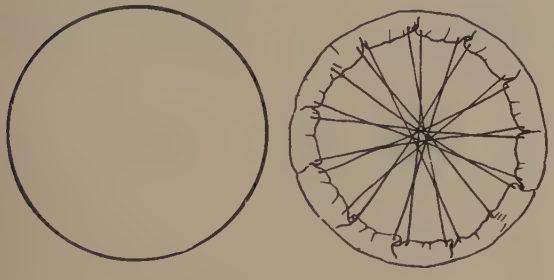
To Cut the Collar Bag.—Cut two cardboard circles 7 inches across and two linen circles 8¼ inches across for the bottom of the bag. Cut a piece of linen 15 inches long and 23 inches wide for the side part.

To Make the Bag.—Put a layer of cotton between the cardboard and the linen circles, and sew the edges of the linen over the cards. Then



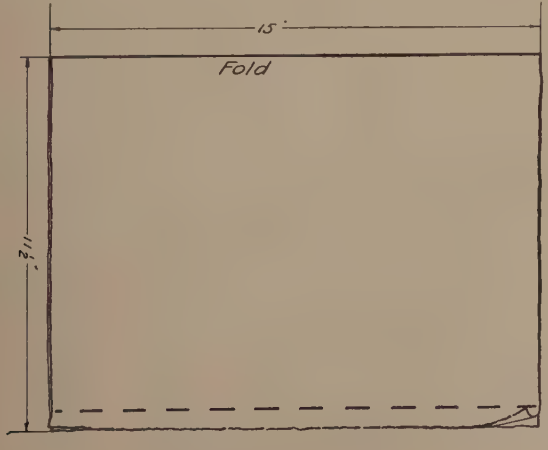
LAUNDRY BAG AND COLLAR BAG

overhand the two circles together. Fold the side piece lengthwise and make a ½-inch seam, joining the two edges 15 inches long. Crease this



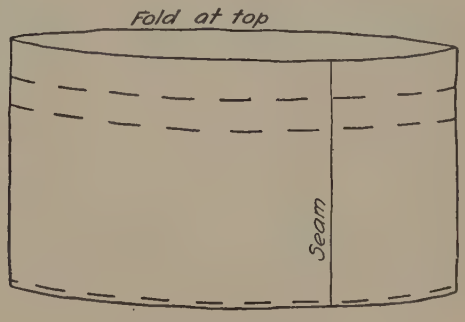
BOTTOM OF COLLAR BAG

seam open and make a ½-inch turning on the top and bottom edge. Now fold the bag, bringing the top and bottom folded edges together and



SIDE OF COLLAR BAG

baste. Make a line of basting 1 inch from the top and a second line ¾ inch below the first, to make a casing for the cord. Finish with the outline stitch. Cut a slit in the casing through one thickness at the seam and at the point opposite the seam. Sew this over and over with thin brown floss to make it strong. Overhand the two folded edges at the bottom of the side piece



THE COLLAR BAG

to the circular bottom piece with brown mercerized floss, making the stitches even and regular for a pretty finish. Make a cord like that in the sewing bag on page 232.

The Laundry Bag

This laundry bag will be convenient, hung on the inside of father's closet door. It may be made out of heavy gingham or linen. For the one in the picture 1¾ yards of material 27 inches wide, or 1 yard of material 42 inches wide, are needed. A strip of wood, or a rod 20 inches long, is run in on top of the bag to hold it stiff.

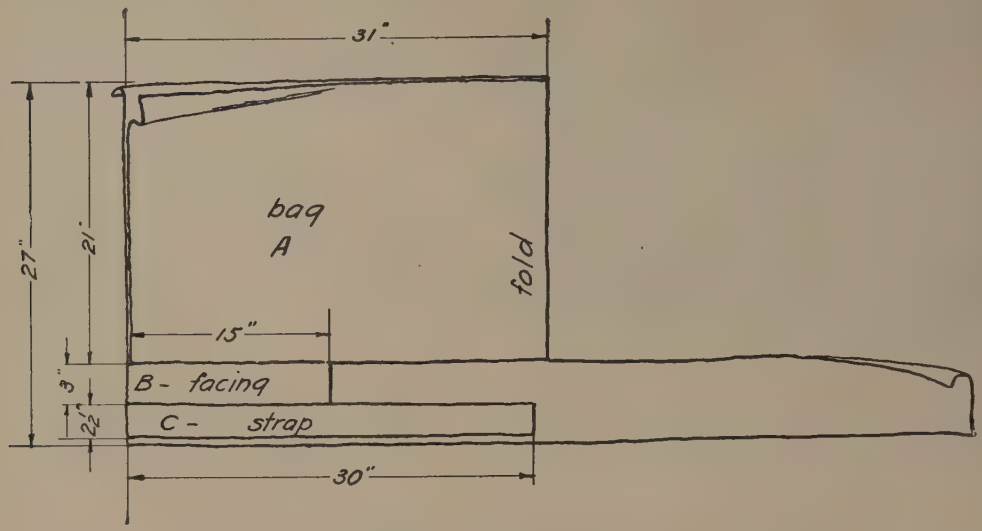
To Make Laundry Bag.—Cut the three pieces: (A) The bag, (B) the facing for the opening, and (C) the straps, according to the chart for 27 inches of material, or 42 inches of material.

Mark an opening in the center with a line of basting 12 inches long, beginning 3 inches from the top. Cut the slit through one thickness of the material only. Cut a slit 12 inches long in the width of the facing strips. Baste this to the opening of the bag, ¼-inch seam stitch on the machine, or back stitch by hand around opening, making square corners.

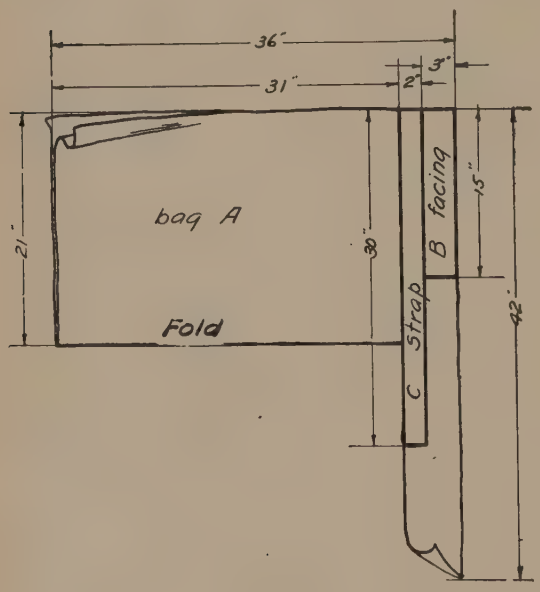
Cut diagonally from the end of the slit to each corner, being very careful not to cut the stitching. Now draw the edges of the facing through the opening to the wrong side and crease the seam sharply. Smooth it out flat on the wrong side; turn in the edges of the facing ¼

inch and baste to the bag. Fasten this with the chain stitch, or feather stitch, on the right side.

Make a plain seam ½ inch wide on three sides (the fourth side is a fold), leaving 1 inch on each side of the top to slip in the straps to hang the bag up by. Stitch on the machine or back stitch by hand; overcast the edges of the seam to prevent raveling. Turn the bag right side out through the opening. Baste across the top 1 inch from the edge to make the casing for the stick or rod. Fasten this with the same stitch used on the facing of the opening. Slip the rod in the casing through the opening left at the end of the top. Next make the strap to hang the bag up by. Make a ¼-inch turning on each side of the piece cut for the straps. Baste these folded edges together and stitch on the machine, or sew with the fancy stitch used on the casing and facing. Slip the ends of the strap in the opening at the other end of the casing, and sew securely. A second row of fancy stitches may be put across the top, but this is not necessary if the straps are sewed in neatly.



CUTTING THE LAUNDRY BAG FROM 27-INCH MATERIAL



CUTTING THE LAUNDRY BAG FROM 42-INCH MATERIAL

GIFTS FOR BABY BROTHER OR SISTER

The Bib

Baby sister will like to wear a bib which has some little rabbits or ducklings cross-stitched on it as in the picture.

Fifteen inches of basket weave cloth will make four bibs, or two bibs may be cut 9 by 15 inches, and the rest of the material used for a tray cloth, which would be a nice gift for mother or auntie. Basket weave cloth is the best material to get, because it is woven in little squares which are used as a guide for the cross stitch. Twenty-seven inches of twilled tape ¾ inch wide is needed for each bib. The cross stitch is done with heavy mercerized cotton floss.

BIBS

To Make the Bib.—Use a piece of basket weave cloth 9 by 15 inches. Make a hem about ¼ inch wide; on all four sides cut out the neck at one end, as shown in the diagram. Fold the tape in the middle lengthwise, and press in the crease with an iron. Slip the raw edge of the neck into the tape, and baste it into place, leaving the ends to tie in the back. Stitch this on the machine, or back stitch it firmly by hand. Hem the ends of the tape.

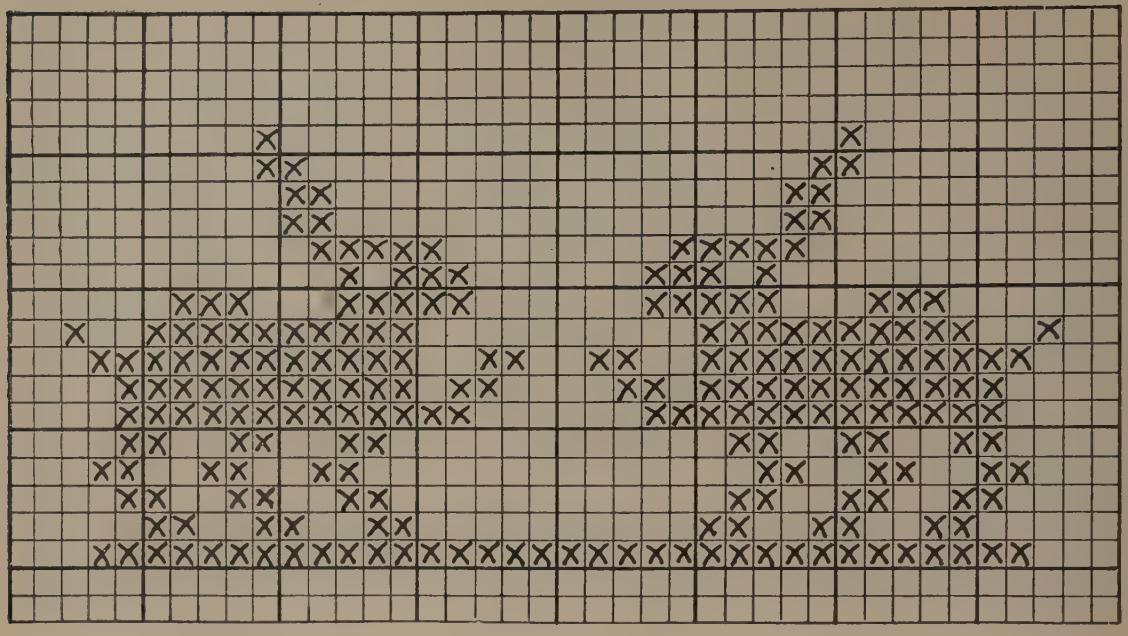
Now you are ready to make the little rabbits or ducks. How to make the cross stitch is explained on page 234. Find the center of the bib and make a line of 56 cross stitches about 1 inch from the bottom of the bib, that is 28 stitches on each side of the center. Beginning with the foot of the rabbit or duck nearest the center, make a cross stitch for each cross shown in the pattern, following the little squares in the material. Be careful to cross the stitches the same way each time.

CUTTING THE BIB

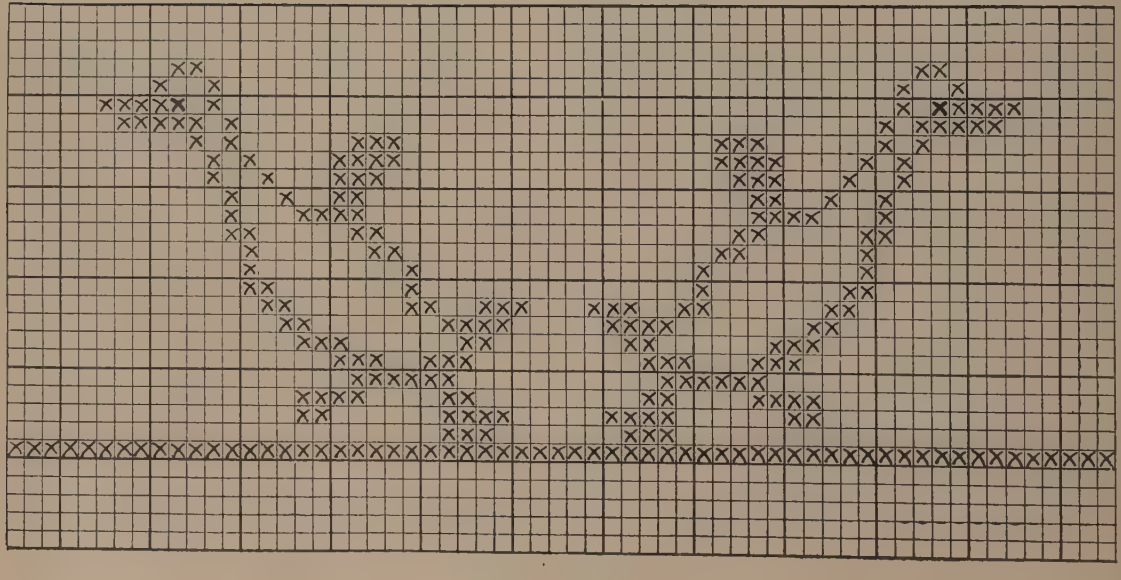
The Pussy Cat Bean Bag

Did you ever play with a bean bag? The one in the picture is made in the shape of a pussy cat.

To Make the Pussy Cat Bean Bag.—One-quarter of a yard of gray canton flannel will



BORDER FOR BIB

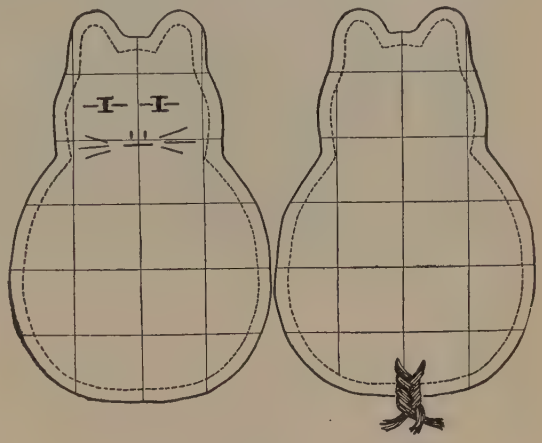


BORDER FOR BIB

make four bean bags. Rule a piece of paper in 1-inch squares, and copy the pattern carefully, both the outside lines and the nose, mouth, eyes, and whiskers. Cut out the paper pattern on the

BEAN BAG

outside line. Cut two pieces like this out of the gray canton flannel. Baste the pattern on the right side (which is the fuzzy side) of one of the pieces, and with black yarn in a large needle make three long stitches on each side of the mouth for pussy's whiskers, a shorter stitch for his mouth, and two small ones for his nose. The four outside stitches for his eyes should be made with yellowish-green yarn, then a black up-and-down stitch for the long, narrow pupils of pussy's eyes. Make these stitches right through the paper and cloth in the lines you have marked, then tear the paper away. Next baste the two parts of the pussy cat together with the two fuzzy sides inside. Stitch on the sewing machine or back stitch firmly ¼ inch from the edge, leaving it open 2 inches at the bottom to put in the beans. Now turn the pussy right side out and fill him half full of small dry white beans. Sew up the



BEAN BAG

EACH SQUARE EQUALS ONE INCH

2-inch opening good and tight with the over-handing stitch. To make the tail, thread six pieces of yarn into a large needle and take a stitch about ¼ inch long about ½ inch from the seam. Draw the six strands of yarn half-way through, and braid these together. Finish with a knot.

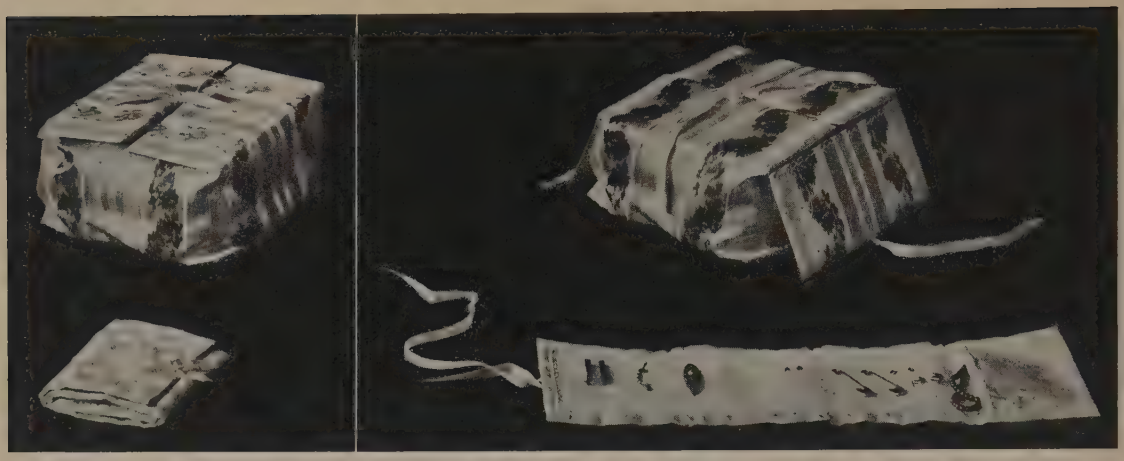
GIFTS FOR SISTER

The Pin Case

Plain pins, fancy pins, strings of beads, and bracelets may all be kept in this pin case. It is especially useful for carrying such things while traveling. It is a pretty gift for sister when she goes away to school.

One-half yard of ribbon 5 inches wide, 15 inches of ribbon ¼ inch wide, and a piece of single-faced eiderdown 14 inches long and 4 inches wide are needed for the pin case. Knitting or crocheting silk, or a hard twisted embroidery floss, may be used for the decorative stitch.

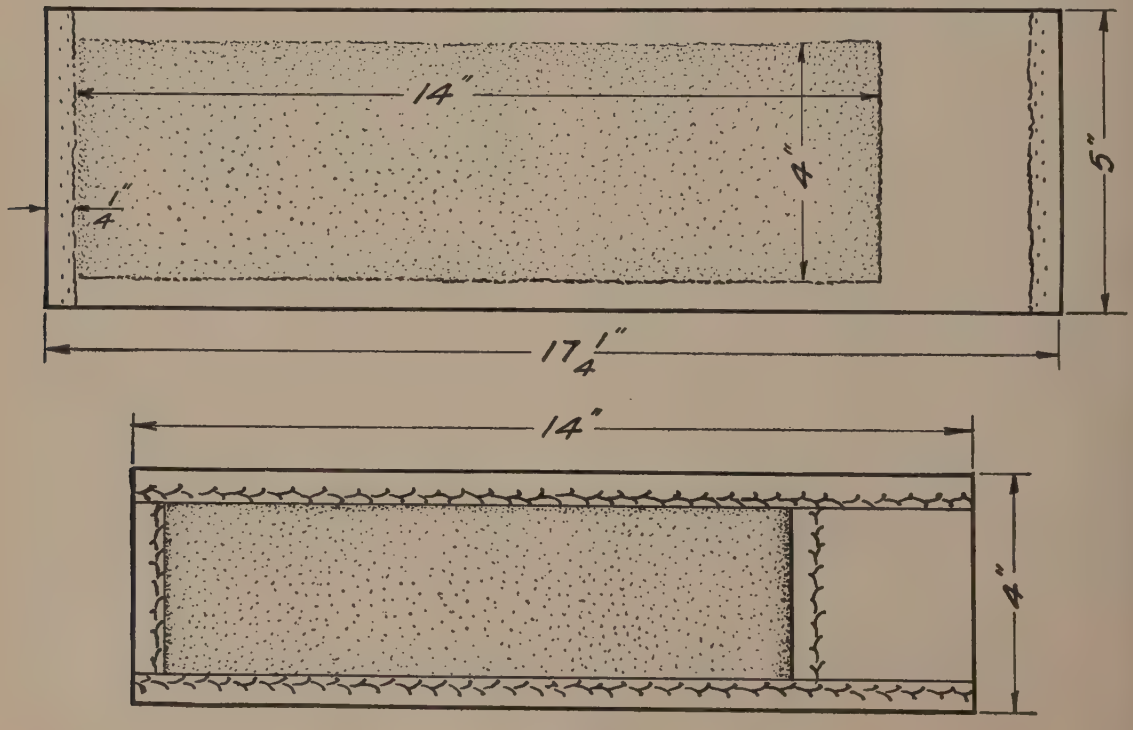
To Make the Pin Case.—Baste a hem ¼ inch wide on one end of the ribbon. Feather stitch or chain stitch this on the right side. This finishes the top of the pocket. Fold the other end



CLOSED HANDKERCHIEF BOX AND PIN CASE OPEN

in ¼ inch, cut the edges of the eiderdown very straight and even. Lay the eiderdown on the ribbon (diagram A) and fold and baste the edges of the ribbon over the eiderdown, making a pocket at one end (diagram B).

Feather-stitch or chain-stitch the edge of the ribbon to the eiderdown, being careful not to catch the stitches through to the outside. Fold the case so that the pocket end will be on the inside. Tie the narrow ribbon around it to keep



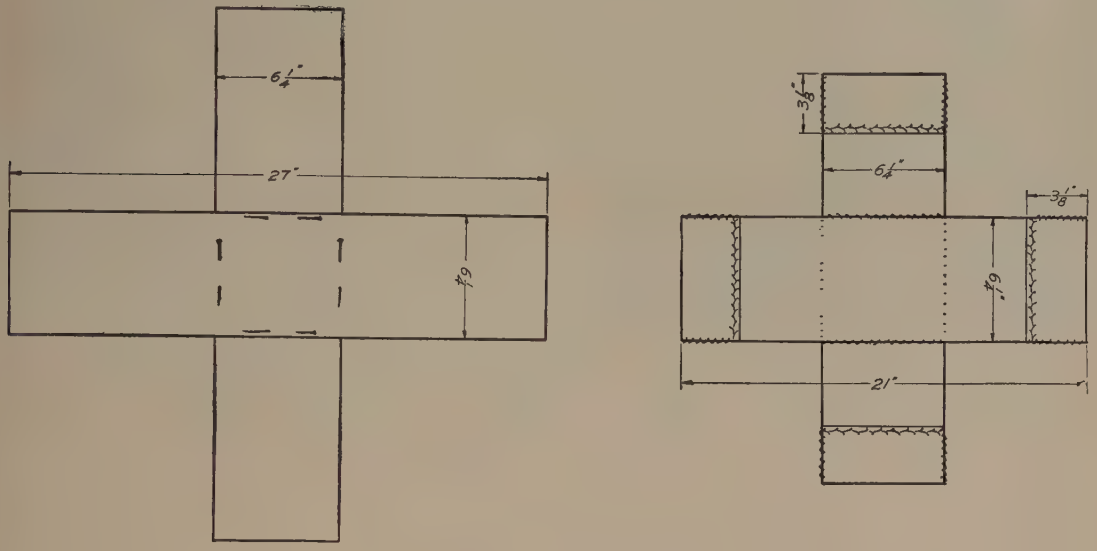
PIN CASE

TOP—DIAGRAM A. BOTTOM—DIAGRAM B.

it closed, and sew it firmly to the end of the case so that it will not get lost.

The Handkerchief Case

This handkerchief case is pretty for sister's bureau drawer and may be conveniently carried with her when traveling. One and one-half yards of ribbon 6¼ inches wide, two-third yard baby ribbon. three pieces of cardboard 6 inches square, some sachet powder; and cotton for the padding are needed to make the case in the picture.



HANDKERCHIEF CASE

To Make the Handkerchief Case.—Cut the ribbon in half, making two pieces 27 inches long. Be sure that the ends are cut even. Put a layer of cotton on each side of one of the cardboard squares; sprinkle a little sachet powder on the side which is to be the inside of the bag, then place the card and padding between the two pieces of ribbon, as shown in diagram. Pin into place, being careful to get the square card exactly in the center of the ribbon. Now fold the ribbon back and overhand around the four sides of the card. Next cut the other two cardboard squares exactly in half. Cover each one with cotton as you did the bottom. Make a ¼-inch turning on each of the four ends of the ribbon, and feather stitch.

Then fold the ends over 3⅛ inches and overhand the edges, leaving the feather-stitched end open to slip in the card. Next overhand the edges together at each corner from the bottom as far as the feather-stitched hem, making a little box-shaped case just the size of a folded handkerchief. Sew a piece of baby ribbon 6 inches long to the center of each end. These are tied in a bow when the handkerchief case is closed.

GIFTS FOR AUNTIE

The Tray Cloth

This tray cloth will be pretty for Auntie's tea tray when she serves tea. It is made of basket-weave cloth and cross-stitched with light brown mercerized floss.

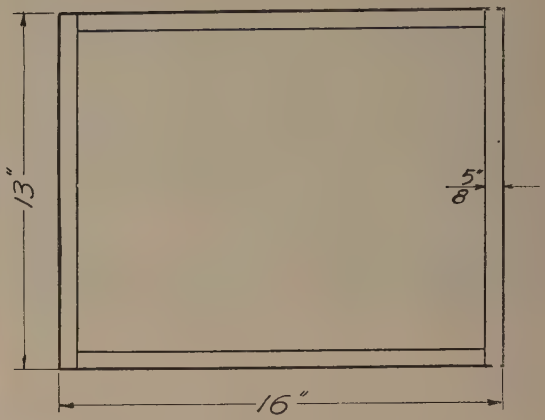
To Make the Tray Cloth.—Cut a piece of basket-weave cloth about 16 inches long and 13 inches wide. Baste a hem ⅝ inch wide on the two sides, then on the two ends. Make the cross-stitch border, following the squares in the material. The solid line of cross stitches should fasten the hem.

The Sachets

Auntie will like to scatter these dainty sachets through her bureau drawers. They may be made

TRAY CLOTH

TRAY CLOTH BORDER



TRAY CLOTH—DIAGRAM

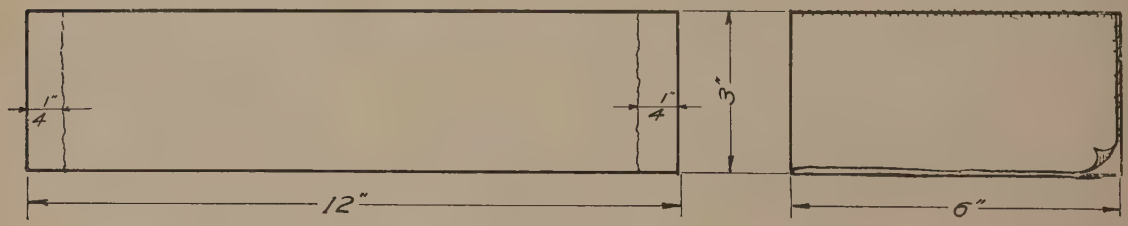
any size or shape. Just a tiny bit of lavender or violet sachet powder should be used. Each one of these little pads is 3 inches wide and 6 inches long. They are made out of pink, blue, lavender, yellow, and green ribbon, 3 inches wide, but scraps of silk or satin may be used just as well.

To Make the Sachets.—Make a ¼-inch turning on each end of a ribbon 3 inches wide and 12½ inches long. Fold the ribbon, bringing the two ends together. Overhand one side and the end, to make a little case for the padding. Then sprinkle a little sachet powder between two layers of cotton just the size of the case, and slip this in, making a little pillow-like pad. Overhand the edges of the opening. Make the other four pads the same way, and tie them all together with a narrow ribbon.

GIFTS FOR GRANDMOTHER

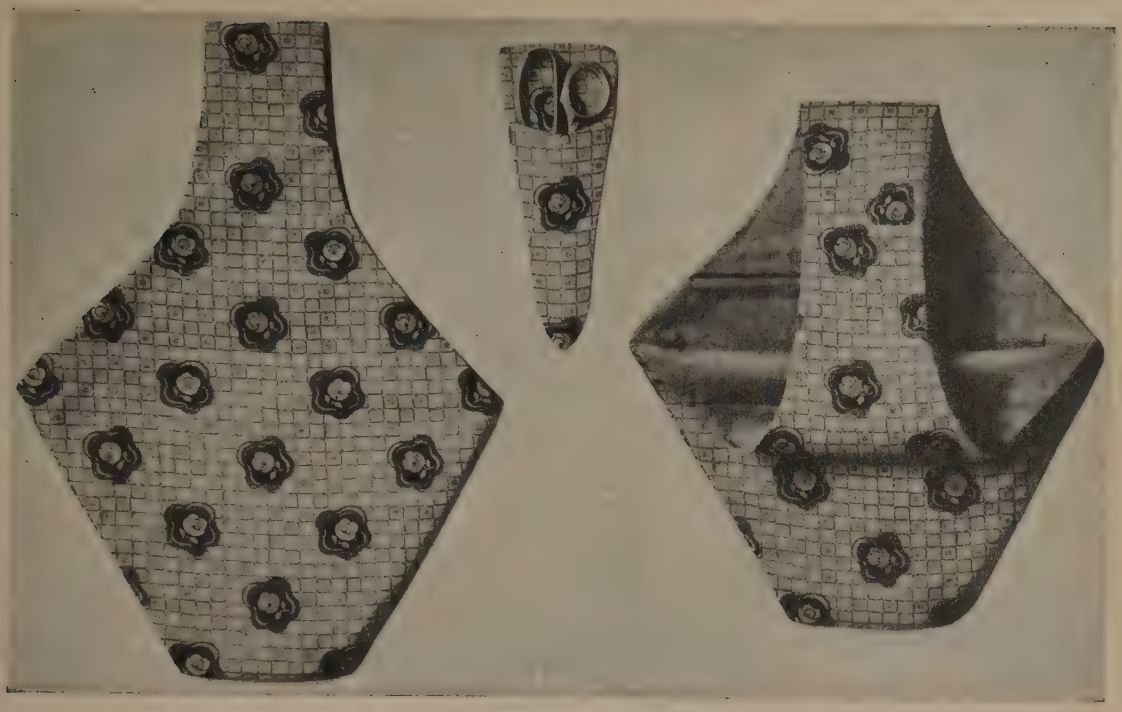
The Knitting Bag

A knitting bag made out of a pretty chintz or cretonne is a gift which will please grandmother. One-half yard of chintz and ½ yard of satin or lining material are needed to make this bag. The scissors shield is made out of the pieces which are left. The bag in the picture is 18 inches long and 15 inches wide at its widest point.



SACHET

To Make the Bag.—Make a pattern like the chart, or draw a pattern of your own. Cut two



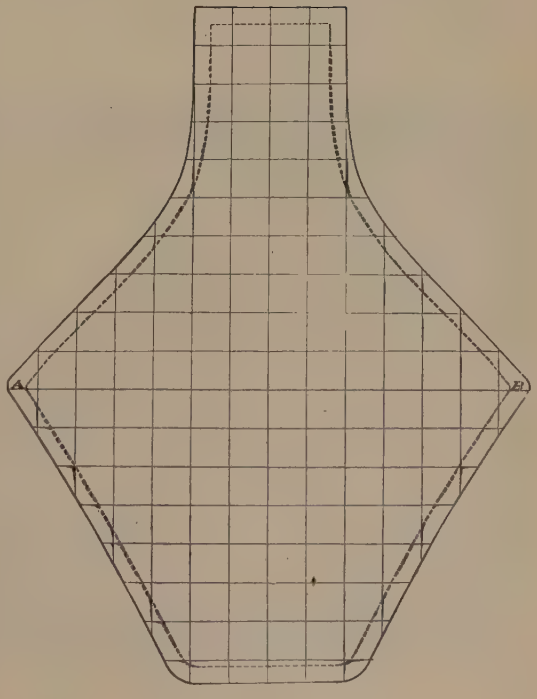
GIFTS FOR GRANDMOTHER.

pieces like the pattern out of chintz and two out of the lining material. Lay the two right sides of the chintz pieces together and baste a seam ½ inch wide from A around the bottom to B. Stitch on the machine or back by hand. Next fold open the top part and place the right side of the lining to the right side of the chintz. Sew both sides together from the top to points A and B. Next sew the two lining pieces together, leaving 6 inches open at the bottom. Turn the bag right side out through this opening, then sew up the opening with the overhanding stitch. Sew the two parts of the handle together so that the joining shows as little as possible.

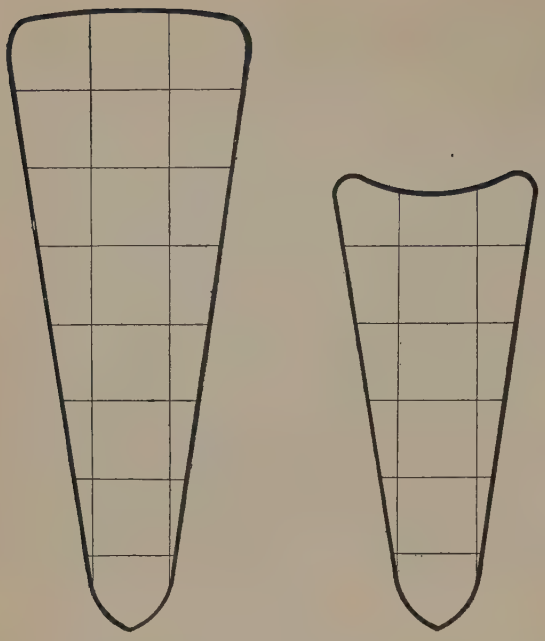
The Scissors Shield

The scissors shield may be made out of scraps of linen, cretonne, chintz or ribbon. Such a shield as this will keep grandmother's scissors from poking through her bag or basket.

To Make the Scissors Shield.—Copy the pattern of the two parts on a piece of paper, and with these as a pattern, cut the two pieces of cardboard. Then cut two pieces of chintz, like each cardboard piece, but allow ½ inch all the way around for the seam.



BAG



SCISSORS SHIELD

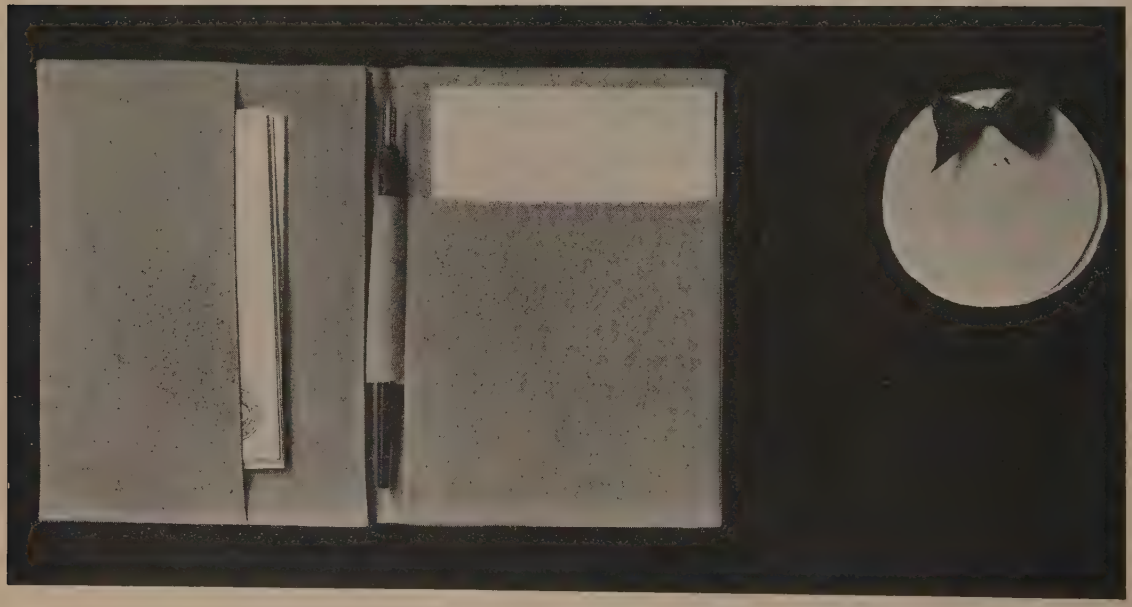
Stitch or back stitch the two pieces for the under part together and the two pieces for the upper part, leaving the top of each open to slip in the cardboard pieces. A good way to be sure that the cardboard will exactly fit is to baste the pieces together with the cardboard between them. Take it out while stitching, as it will be in the way. Now turn each of the pieces right side out, slip in the cardboard pieces, and sew up the opening as neatly as possible with the overhand stitch. Overhand the smaller piece to the larger piece, and the scissors case is very neatly finished.

GIFTS FOR GRANDFATHER

The Writing Case

Grandfather will find it very useful to have letter paper, envelopes, and pen in this little case, which he can carry with him wherever he goes. One-half yard of brown chambray gingham or linen crash, 27 to 36 inches wide, and two pieces of cardboard 6 inches wide and 8¼ inches long, are needed for the one in the picture.

To Make the Writing Case.—Cut the pieces according to the diagram. Fold and crease pieces A, B, and C, as shown by the dotted lines. B and C are the pocket pieces, and are sewed to the main part of the case with the combination stitch, or stitched on the machine, exactly on the creased lines. Now fold each pocket piece over toward each end and pin in place. Piece D forms the loop which holds the pen. Sew the

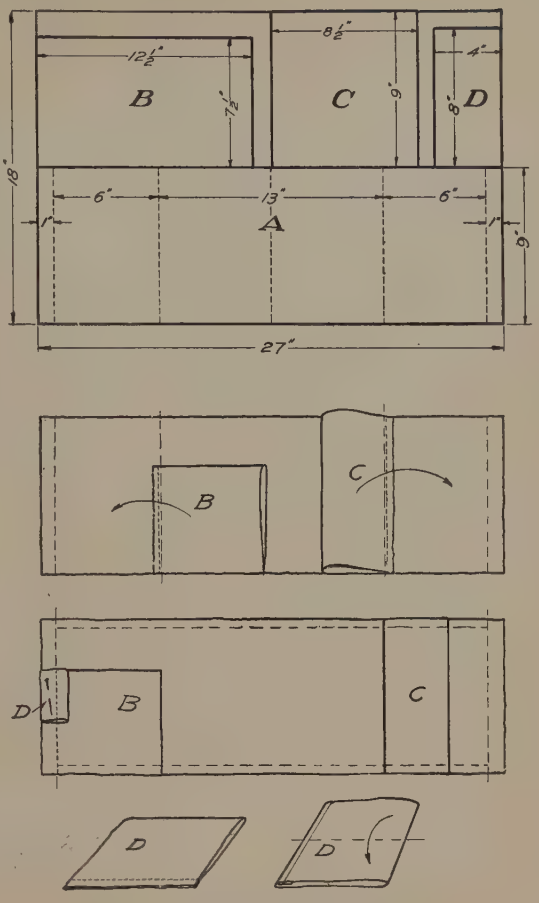


WRITING CASE AND HOLDER FOR SHAVING PAPER

two ends together in a seam ½ inch wide, then turn it right side out. Crease in the center so that the seam is on the inside. Pin D on B, as shown in chart.

Sew B and D to A, 1 inch from edge, with the combination stitch. Next make a turning 1 inch wide on each end, then fold the ends toward the center, as indicated. Sew the seams ¼-inch wide, using the combination or back stitch.

Now turn the case right side out and hem the little space between the pockets as neatly as possible. Slip a card in each end, but do not sew them in as it will be convenient to take them out when the case is washed. A pad of writing paper 5 inches wide and 7½ inches long will fit in the pocket B. Put the envelopes in pocket C.



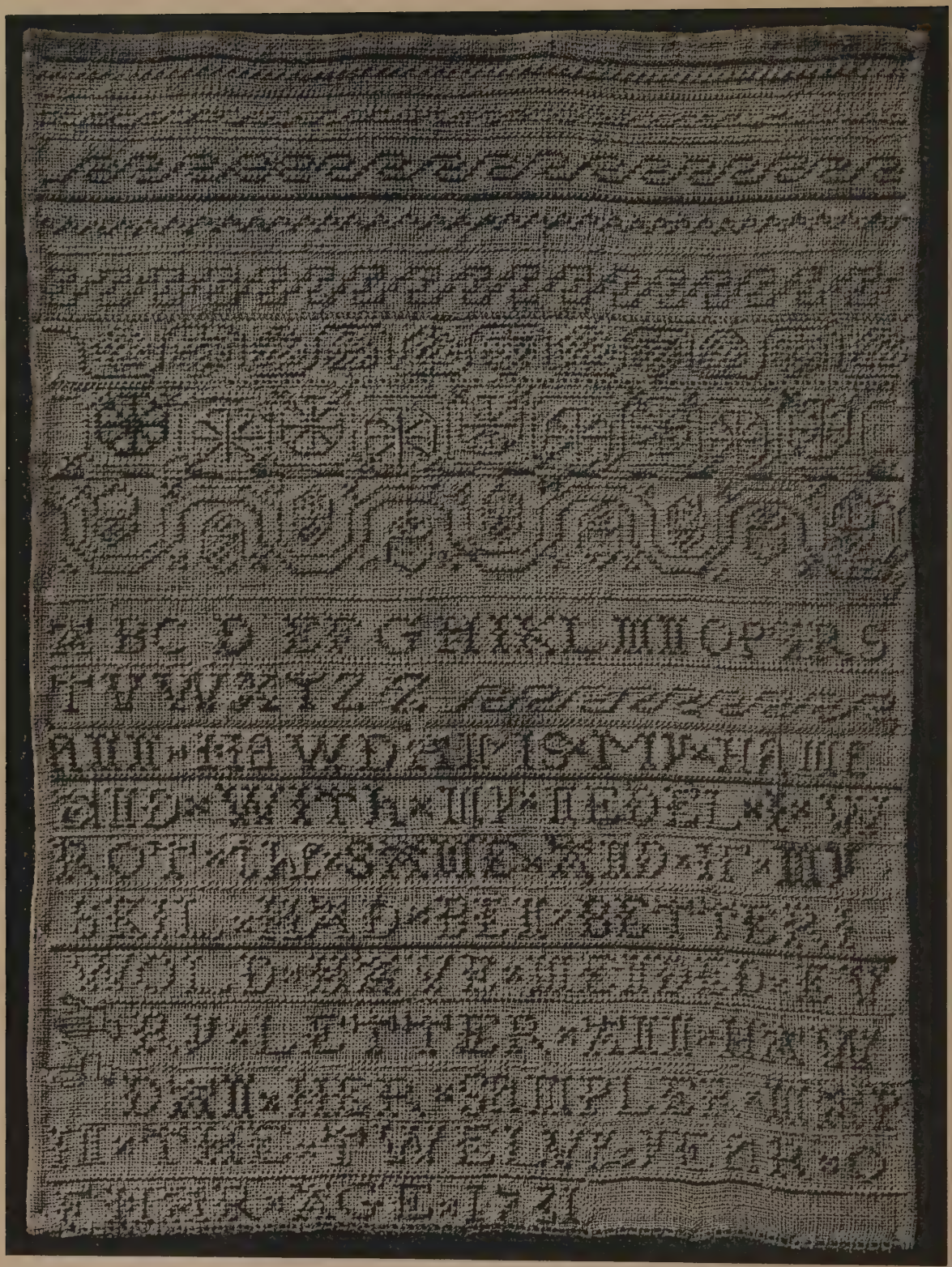
THE WRITING CASE

Polisher for Spectacle

This little polisher is quickly and easily made and will be very handy for grandfather to carry in his pocket and use to polish his glasses. A piece of chamois skin about 6 inches long and 8 inches wide, and one-quarter yard of narrow red ribbon are needed to make it.

To Make the Polisher.—Draw two circles on the chamois skin; 3 inches across the top of a teacup is about the right size. Cut these out carefully, and tie them together at one side with the ribbon.

These gifts are suggestions of other useful and attractive things which it will be a pleasure for you to give and for others to receive.



A SAMPLER—QUAINT AND PRETTY, BUT AWE-INSPIRING WITH ITS THOUSANDS OF TINY STITCHES

HANDICRAFT FOR GIRLS

SAMPLERS: A GIRL'S LOST ART

BY SYLVIA SHERWOOD

A FEW people to-day have hanging upon their walls, carefully framed, some beautiful examples of old-fashioned needlework, done in colors on soft-tinted linen. It came down from an ancestor, and it was wrought in her girlhood many years ago. It is highly prized, and rightly, for such examples, or "samplers," as they are called, may never be made again.

Yet for over four hundred years a sampler was a girl's most valued achievement in handicraft. We would say now that for young girls the making of fine stitches would be harmful, and to the older ones in these days of fine machine-work it is unnecessary. They speak to us of a more leisurely age, when young ladies had time to sit still, and to stay at home.

Samplers are mentioned in books before Columbus. In his "Midsummer Night's Dream" Shakespeare has two girl-friends—

"Both on one sampler, sitting on one cushion,
Both working of one song."

But the earliest existing sampler is dated 1643, and no new ones are known to have been made during the past half century.

We in America think of them as associated with the Puritan Mothers, and the girls of the Revolution, and later, those gentle young ladies who wore curls and hoop-skirts, and read "Godey's Lady's Book." Dimly we can realize how proud these young persons were of their wonderful stitches. Miss Mitford, in "Our Village," tells about her heroine "Lucy" and her sampler. Her description of one describes them all.

"She held it up with great delight, pointed out all the beauties, selected her own favorite parts, especially a certain square rosebud, and the landscape at the bottom; and finally pinned it against the wall to show the effect it would have when framed. Really, that sampler was a superb thing in its way. First came a pale pink border; then a green border, zig-zag; then a crimson, wavy; then a brown one, of a different and more complicated zig-zag; then the alphabet, great and small, in every color of the rainbow, followed by a row of figures, flanked on one side by a flower, unknown, tulip, poppy, lily—something orange or scarlet; on the other by the famous rosebud, then divers sentences, religious and moral—Lucy was quite provoked with me for not being able to read them—then last and finest, the landscape in all its glory. It occupied the whole narrow line at the bottom. In the center was a house of bright scarlet, with yellow windows, a green door, and a blue roof; on one side a man with a dog; on the other a woman with a cat—this is Lucy's information; I should never have guessed that there was any difference, except in color, between the man, and the woman, the dog and the cat. Next to these figures, on either side, rose two fir-trees, from two red flower-pots, nice little brown bushes of a bright green, or intermixed with brown stitches. I looked at the landscape almost as lovingly as Lucy herself."

The sampler was at the beginning made of odds and ends of cloth for the purpose of keeping a record of designs, then it was made to note down alphabets and lettering, and finally for display. You can see from Miss Mitford's description how quaint and really pretty the finished work would be, with its bright colors, its fine stitches, its formal patterns, and its loving personal touches.

These personal touches were most delightfully expressed in the inscriptions that were chosen by the girls who made them or by their mothers

or friends. They were, as Miss Mitford states, usually "divers sentences, religious and moral." A part of one of the early ones reads as follows:

> "Elizabeth Matrom is my name, and with my Nedell I rought the same, and if my Judgment had beene better, I would have mended every Letter. And she that is wise, her time will prise, she that will eat her Breakfast in her Bed, and spend all the Morning in dressing of her Head, and sat at Deaner like a Maiden Bride, God in her mercy may do much to save her, but what a cas is he in that must have her."

The most famous sampler in the United States is no doubt that of Lora Standish, daughter of the famous Captain Myles Standish, which may yet be seen in the museum at Plymouth, Massachusetts. It reads:

"Loara Standish is My Name
Lord Guide My Heart that I may do Thy Will
And fill my hands with such convenient Skill
As will conduce to Virtue void of Shame
And I will give the Glory to Thy Name."

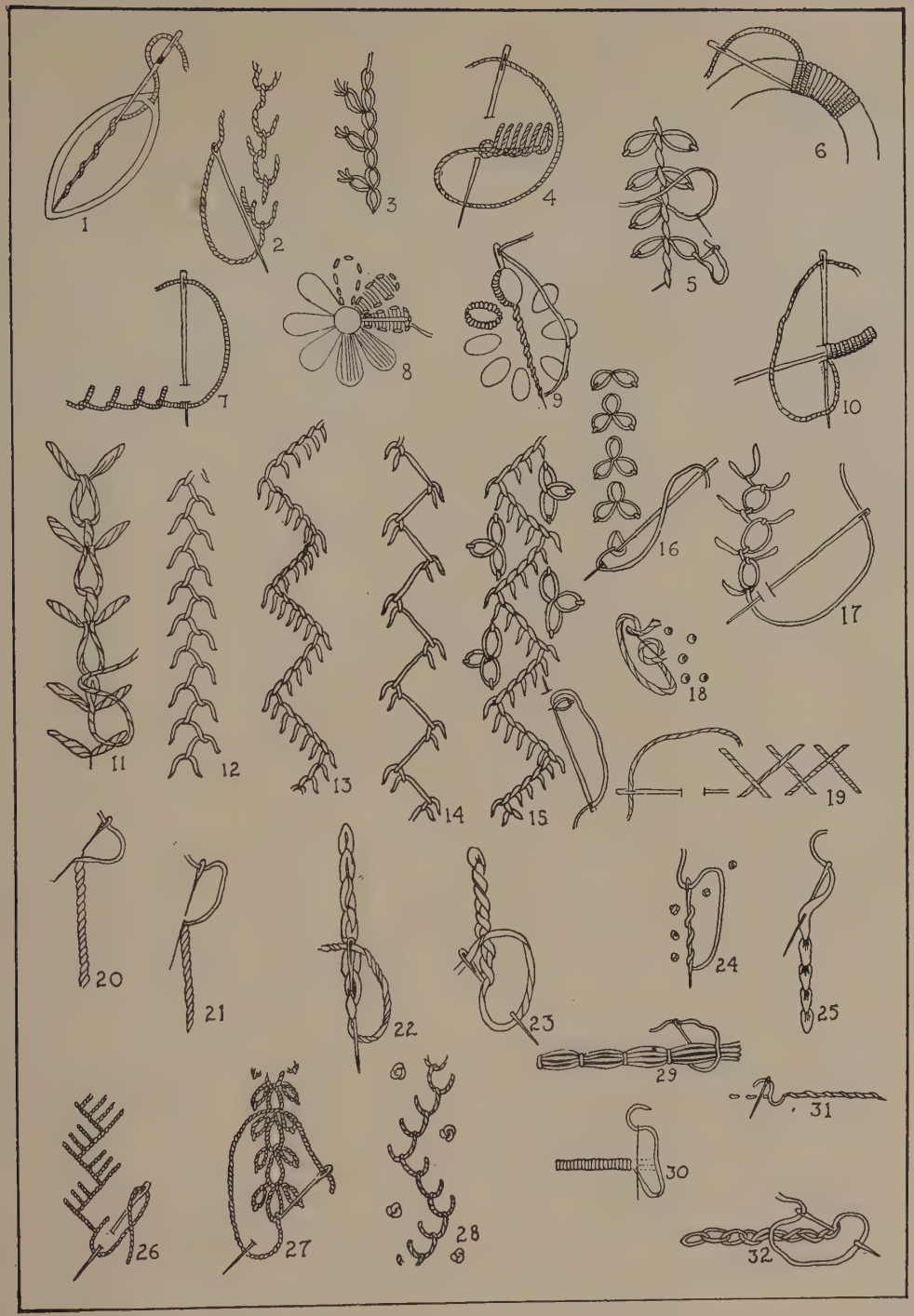
Perhaps the prettiest, as it is the most usual, of the inscriptions is this, of which one example remains that was done by a child of seven:

"Lord permit thy gracious name to stand
As the first effort of young Phœbe's hand,
And while her fingers on this canvas move
Engage her tender Heart to seek thy Love
With thy dear Children let her Share a Part
And write thy Name thyself upon her Heart."

So, for many generations, in castle and in cottage, our gentler, more patient ancestors wrought, sometimes no doubt with tears, and pricked fingers, their little bright masterpieces. May their flowers and their mottoes and their memories never fade.

EMBROIDERY STITCHES

The many kinds of embroidery stitches shown in the accompanying picture will furnish valuable suggestions for little needlewomen. The diagrams need little explanation; thus, in No. 1 the silk is loosely wound round the needle before putting the needle-point in the fabric. This forms a heavy ridge that may be effectively introduced into a flower or leaf. No. 2 is only a loosely-made feather stitch. In No. 3 the worker must first make a line of stitches similar to those shown in No. 16 or 27. The three single stitches on the edge are made afterward. No. 4 shows a loose stitch often seen worked in wool on the edges of blankets. No. 5 is a delightful combination of daisy petals and outline stitch; the outline stitch being made first. No. 6 shows the right way of rounding a curve—by crowding the stitches a little on the inner side. No. 7 is a very open stitch, useful in fastening down an edge inclined to ravel. No. 8 shows a shadow stitch, useful on very thin material. This is worked on the wrong side of the material, and the shadowy outline, seen on the right side, is very dainty. No. 9 shows a heavy edge that is used effectively in "eyelet" work. No. 10 illustrates a heavy stem, for a thin cord is held over the outline of a stem, and fastened in place by small, closely-set stitches. No. 11 shows the ox-horn stitch; in



HOW EMBROIDERY STITCHES ARE MADE

1, Twisted stitch; 2, Feather stitch; 3, Wedgwood stitch; 4, Scroll or stem stitch; 5, Daisy petals with outline center; 6, Rounding a curve; 7, Blanket stitch; 8, Raised shadow stitch; 9, Bullion stitch; 10, Raised stem stitch; 11, Buffalo or ox-horn stitch; 12, 13, 14, and 15, Feather stitches; 16, Clover-leaf chain stitch; 17, Brier stitch; 18, French knot; 19, Cat stitch; 20, Thick outline stitch; 21, Outline stitch; 22, Chain stitch; 23, Twisted chain stitch; 24, French knot; 25, Split outline stitch; 26, 27, and 28, Feather stitches; 29, Couching stitch; 30, Narrow satin stitch; 31, Twisted outline stitch; 32, Double chain stitch.

this the middle loop is first made, then the branching side-loops. Nos. 12, 13, 14, and 15, as well as 26, 27, and 28, are all pretty variations of the ever popular feather stitch. In No. 15 the little clover-leaf addition is made after the main outline is completed. No. 17 is a pretty combination of an open chain stitch and ox-horn. Nos. 18 and 24 show French knots; these are formed by twisting the silk or thread two or more times around the needle and then putting the needle into the same point from which the thread issued. These knots may be effectively introduced in many pieces of embroidery. A double row of chain stitches with French knots dotted between them make a dainty trimming. No. 19 is the familiar cat stitch, used principally on flannel; this is worked from left to right, so in order to see how it is made, turn the diagram upside down. Nos. 20 and 21 are outline stitches, useful in embroidering stems. Nos. 22 and 23 show the familiar chain stitch and a pleasant variation of it, while No. 25 shows a split outline stitch, useful in working in wool. No. 29 is a popular and effective stitch, for "couching" is quickly made and on a large outline the effect is striking. No. 30 shows a fine, narrow stitch that is useful in marking table linen. No. 31 shows a twisted outline stitch, in which a straight, every-day sewing stitch is first made and then half-covered by a slanting little stitch. No. 32, the last of all, should really have stood at the head, for it is the simplest and one of the prettiest stitches made, and the one that should be learned first by any little girl who wishes to become skilful in the lovely art of embroidery—one of the most interesting of the household arts.

RAFFIA WORK FOR YOUNG PEOPLE

BY ELIZABETH MACKENZIE

Basket-making should be especially interesting to our boys and girls, because it was our own American Indians who first raised the work of making baskets into an art. While the men were engaged in hunting, fishing, or war, the women were home busy with domestic duties and making blankets and baskets. It was in the patterns and designs of these baskets that the women told of Indian life; the hunt, the war, even the love story—all were woven in a basket; and while we would write a story or a record on paper, they would tell it by the figures and colors used in the basket.

So beautifully and wonderfully and compactly were these baskets woven that in some of them water could be carried; and so elaborate were they that sometimes an Indian squaw would spend her whole life in fashioning a single basket. To weave the baskets they used long swamp-grasses, reeds and roots, and they often walked miles to get the right kind of material. Instead of grasses and roots, we use raffia and reed and sometimes twine.

Raffia is the outer skin of a long-leaved palm growing in Madagascar. In its natural state it is very tough and creamy in color. It costs about twenty-five cents a pound in its natural color and a little more when dyed red, brown, green or blue. You can buy raffia in seed-stores and in many department-stores. Raffia work is so easy to learn that every boy and girl can make pretty and useful baskets.

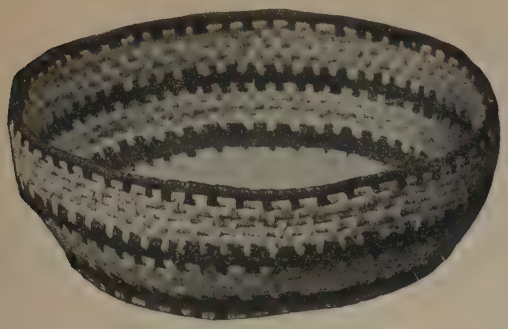
There is great delight in watching a basket grow in size and beauty. All of those shown in the pictures were made in "Lazy Squaw" stitch. This is the easiest stitch to learn as well as the quickest to use. When an Indian squaw wished to hurry with her work, she always used this stitch, much to the disgust of the more industrious of the tribe. They considered her very lazy and named the stitch after her.

For the work of making baskets, we will need raffia, natural and colored, reed and twine; also needles both blunt and sharp, numbers 18 and 20. Work on all baskets begins in the middle of the bottom. If reed is used it will first have to be soaked to make it pliable. Soak it at least ten minutes in hot water and longer in cold water. Twine is really better as a foundation. It does not have to be soaked before using, and being softer, it is easier to work with. It also makes a softer basket when finished.

A SEWING-BASKET IN TWO COLORS

It will be easier to start a basket on a few strands of raffia instead of twine, which must be used later. Thread a sharp-pointed needle with a single piece of raffia, putting through the

eye of the needle the end which seems harder. Take in your left hand the few pieces of raffia which are to form the foundation of the basket



SEWING-BASKET
(Seven inches across.)

and wind the single piece of raffia (threaded on the needle) around these pieces, until an inch or more has been covered; then coil this covered raffia as tight and small as possible to make the little center; sew through this center with raffia-

STRANDS OF RAFFIA WOUND WITH RAFFIA BEFORE COILING

threaded needle and keep on winding and sewing through, until the center is about an inch in diameter. Then work the twine in for the foundation instead of the strands of raffia. Put in

BEGINNING A ROUND BASKET

the end of twine with the several strands of raffia and wind both the twine and the ends of raffia as before. Always carry the ends of the raffia along with the twine for some distance before cutting them off.

After the twine has been put in place it will not be necessary to sew through the twine as in the beginning when raffia formed the foundation. Instead, wind raffia several times around the twine and, with a blunt needle, bind *to* the last row and not *through* it. Wind several times and then bind again. As raffia varies in width, no exact number of stitches can be given, but it is usual to wind twice and then bind. The stitches must be kept close together and the raffia kept as flat and untwisted as possible, in order that the basket may be firm and well made.

When the bottom has been made large enough, start the sides of the basket by placing the next row of twine *above* the last row, instead of at the edge, as in making the bottom. When we have used two rows of natural raffia, we may use red raffia for three rows, then the natural for five rows, red for two rows, five more rows of natural, and finish the top of the basket with one row of red. Be careful in finishing the basket and cover the end of the twine or reed very neatly. The basket may be made in any shape by placing the twine nearer or farther from the center.

Another thing to remember is, in starting a new thread of raffia, to carry what remains of the old thread along with the twine for some distance, and wind and bind the twine and raffia together. If this is not done the ends of the raffia will not be fastened, and the basket will fall apart. Soaking the finished basket in water for a half hour will improve its appearance. The soaking seems to stiffen the basket just enough to make it firm in texture.

FINGER-BOWL COVERED WITH RAFFIA, FOR HOLDING FLOWERS

This little basket for holding flowers was made in the same stitch as the sewing-basket. It was

COVER FOR FINGER-BOWL
(Five inches across.)

fashioned to fit over a glass finger-bowl, so that it could be used for holding cut flowers. When working on a basket of this kind, have the bowl at hand so that the basket may be slipped over the bowl occasionally, to be sure it is the right

size and shape. After the basket is finished, soak it in water, place the glass bowl inside of the basket, and allow the basket to dry on the bowl.

A TRAY MADE OF RAFFIA

THE tray is made over reed instead of twine. As in the baskets, start the center of the tray on raffia. After the little center is made on the raffia, then use the reed. Sharpen the water-soaked reed and push the end of it into the raffia which was used to start the tray. Wind and bind to the last row the same as in making the basket. The tray must be kept perfectly flat, and when it has reached the desired size, make a narrow upright edge, by placing one row of reed *above* the other. Two or three rows will be needed to form this upright edge. After you have cut off the reed, sharpen the end, and carefully finish it so that it does not show where the work stops. The simple design is made in brown raffia by taking a number of stitches in brown and then the same number in natural; then the brown, and so on. The brown is used in the last two rows of the bottom of the tray.

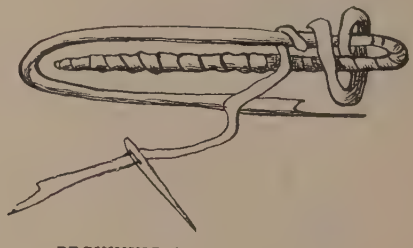
REED SHARPENED, READY FOR USE

A PENCIL-BASKET MADE OF RAFFIA

THIS little oblong basket, which would be very useful for holding pens and pencils, is also made on reed. For a basket of this shape the work in the beginning will be a little different from the work on a round basket. Soak a reed well and then gently bend it, as shown in the picture, so that the center will be about two inches long. Cover the first row of reed with the raffia and bind the next row to it in exactly the same way as in a round basket. Keep the sides straight and firm; and when six rows from the top, start the design with a few stitches in red and about twice as many in the natural, then the red.

RAFFIA TRAY.
(Nine inches across)

PENCIL-BASKET
(Five inches across, three and one half inches deep.)



BEGINNING AN OBLONG BASKET

In the next row make each red space a little larger and continue in this way to the top, when the entire row will be red. Finish the end of the basket as in the tray. The rings on the top of the little basket, by which it may be hung up, are

made of red raffia. Take three strands of raffia and braid them together, and from this braided raffia make two small rings. With red raffia sew these rings to the top of the basket.

More durable rings may be made by winding a few strands of raffia around the finger till a compact ring is formed. This ring may be covered with a buttonhole stitch, the same as is used in making the circles for Renaissance lace.

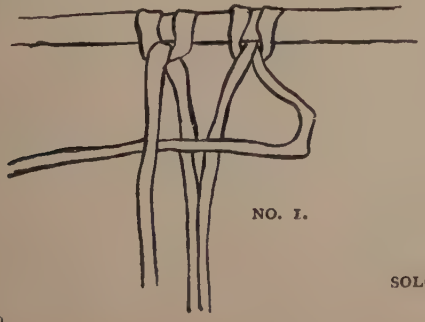
HANGING BOWL FOR FLOWERS
(Bowl three and one half inches across.)

A HANGING BOWL FOR FLOWERS

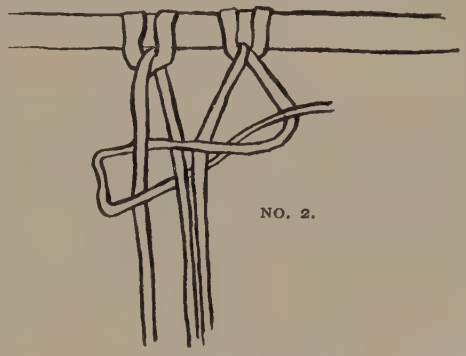
A CHINA bowl with raffia knotted loosely over it becomes a very pretty and useful hanging basket to hold flowers. First make a flat center on reed in the Lazy Squaw stitch. This center should be large enough to cover completely the bottom of the bowl. On this center fashion, at equal distances from each other, eight or more double pieces of raffia. Attach these to the center by slip-knots. Each pair is then knotted to the next by what is called "Solomon's knot."

To make this knot, hold in the left hand one pair of raffia strands, with the single strand of the next at the right. Cross this single piece over at right angles to itself, leaving a loophole at the right-hand side. Next, take the single strand of the left-hand pair and put it over the strand which has crossed the pair, carrying it under the pair, and through the loop at right-hand side. Repeat this, and thus make a firm knot as shown in the diagram. Continue this knotting until the bowl is covered. Then gather the ends of the raffia together, and divide them so as to form two long handles. Braid the raffia and tie at the ends with an ordinary knot. This work is not done on the bowl; but, as before, have the bowl handy so as to try the raffia work on, to fit it properly and closely. After the work is finished, soak it in water, place the bowl in the knotted raffia, and gently pat the raffia into shape so that it fits the bowl. Hang it up and allow it to dry before handling.

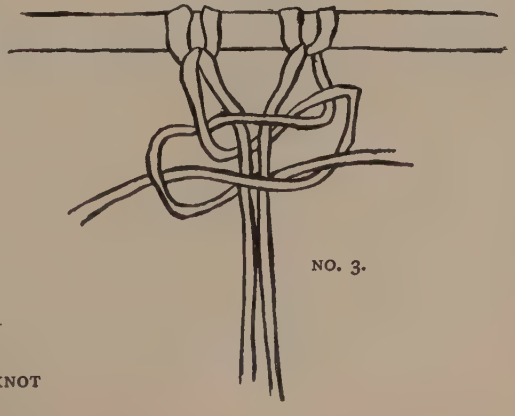
THESE are only a few of the many forms that may be fashioned out of raffia. One may make big baskets and little baskets, baskets made on string foundations and baskets made on reed. Shape and size may be varied to suit the taste of the maker.



NO. 1.



NO. 2.



NO. 3.

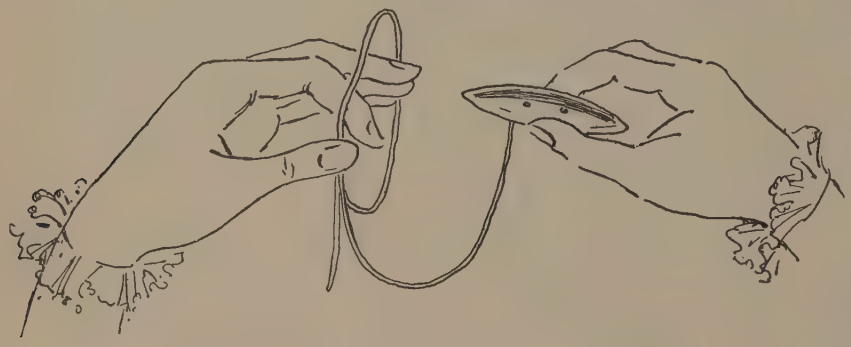
SOLOMON'S KNOT

TATTING

BY HELEN MARVIN

TATTING is such a pretty and simple kind of needlework that every little girl ought to learn how to do it, for it is nothing but a lot of buttonhole stitches made on a thread with a shuttle, instead of on cloth with a needle. There is only one important point about it, and of that I shall tell you later.

When you wish to begin to tat, you must have a shuttle filled with thread. A tatting-shuttle has a cube-shaped inside, inclosed in two long side-pieces that meet at the pointed ends. The cube center has a hole bored through it, and through this hole the end of the thread is passed, then knotted around the cube. After that the shuttle is filled with thread wound around the center cube, and to do this the thread must be slipped in each time between the pointed ends. If the thread for tatting were put on an ordinary spool or shuttle it would slip too easily, and would quickly tangle.

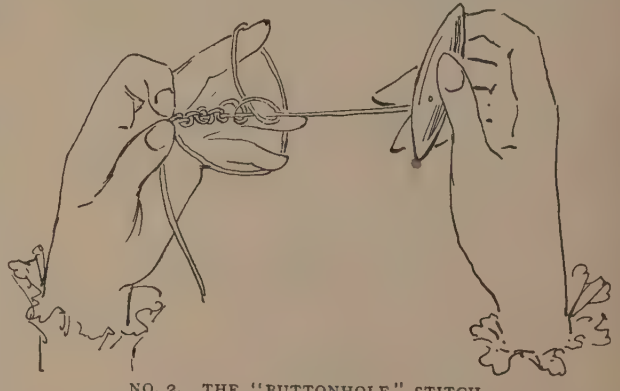


NO. 1. HOW TO HOLD THE SHUTTLE AND THREAD

The easiest pattern in tatting is the single edge which you see in the picture and which we shall now begin to make. Picture No. 1 shows how to hold the shuttle and how to throw the thread in a ring over the left hand. This is done by holding the end of the thread between the thumb and the first finger, with the inside of the hand down and the end of the thread hanging down, too. Pass the thread over the top of the fingers, down and around the inside of the fingers, and again between the thumb and the first finger. This makes what is called the ring.

Begin to make the buttonhole stitch, and picture No. 2 will show how this is done. Each stitch is in two parts and is called a double-stitch in all directions for tatting. This double-stitch is worked as follows: Throw the thread around the top of the hand behind the ring and pass the shuttle from the tips of the fingers beneath the ring and out between the ring and the new thread over the hand. After that is done carry the thread and the shuttle with a quick jerk to the right, so that that part of the thread is straight and tight. If this has been done quickly and tightly enough, you will see that the stitch is going to be formed with the thread of the ring and not with the shuttle thread, as those of us who do not know would suppose. This is the very important point about tatting I told you of. The stitches must be formed with the ring-thread, or, when all your stitches are made, you will find that you cannot pull the ring into a round shape. So when you tat be sure your stitches are made with the correct thread.

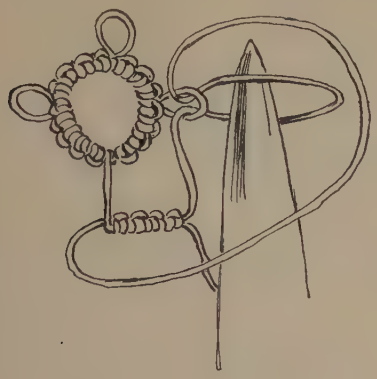
After the stitch is formed with that quick jerk of the shuttle thread, with your forefinger lift the thread over it, tighten the stitch and put it in place. You can do this after a little practice. Never have the ring too large, for with a large ring it is much harder to get the stitches in place.



NO. 2. THE "BUTTONHOLE" STITCH

To make the second part of the double-stitch, let the thread between the shuttle and ring hang down in front of the work, and pass the shuttle under the ring from the back of the hand toward

the tips of the fingers and out between the ring and the hanging thread. Again jerk the thread and the shuttle and form the stitch; this completes the double-stitch. Make 4 double-stitches, then make a picot, which is the name of the lit-



NO. 3. JOINING THE RINGS

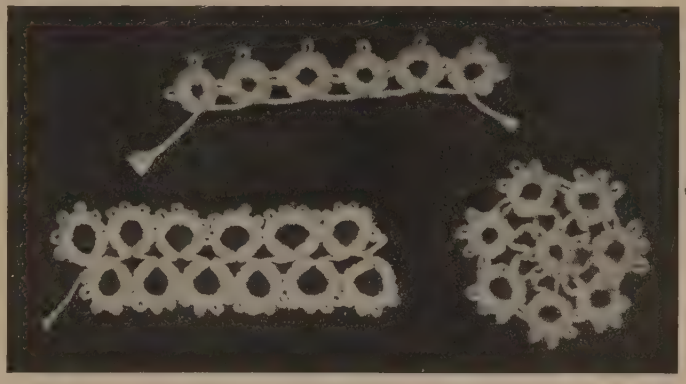
tle loop of thread one sees in tatting. To form this picot make a double-stitch, but when drawing it up do not put it close to the stitch before it, but leave a little space between. When drawn up, this forms the loop. Make 16 double-stitches in all in the ring, with a picot after every fourth stitch. Then take the ring off the fingers, hold the first stitch between the thumb and first finger and draw the shuttle thread until all the stitches are close together and the ring is formed.

All the rings of the edge are made like this excepting that they are joined. Always begin each ring about an eighth of an inch away from the ring before it, and when four double-stitches are made join the ring to the ring before it, shown in picture No. 3, in this way: Pull the ring thread in a big loop through the last picot of the preceding ring. You can do this easily with a large pin. Now pass the shuttle through this loop, and draw the loop up just as though it were a stitch. This joining takes the place of the first picot of the ring.

The insertion, shown in the picture, is just as easy to make as the edge and is made in almost the same way. Each ring has 5 double-stitches to start it, then a picot and 2 double-stitches made over and over until there are 5 picots, and after that 5 double-stitches to finish the ring. A ring is made first for one side of the insertion and then for the other side, so do not join the second ring to the first. Join the third ring to the last picot of the first ring, the fourth ring to the last picot of the second ring, and after that join a ring first to one side and then to the other. This forms a pretty insertion.

The medallion is made almost like the edging, too. Begin with a ring for the center. Make 1 double-stitch, then make a picot and 2 double-stitches over and over until there are 7 picots, and finish the ring with 1 double-stitch. After the ring is pulled tight, pull a loop of the thread next to the ring through the first picot, and join just as though you were joining 2 rings together, leaving about an eighth of an inch of thread between the ring and the joining.

An eighth of an inch along the thread from this joining make the first ring for the edge. These edge rings are made just like those of the insertion and each ring is joined to the last picot of the edge ring before it. Between the rings the thread is joined always to the next picot of the center ring. An eighth of an inch of the thread must be left at each side of each joining. When you make the seventh ring around the edge, instead of making the last picot, join the ring to the first picot of the first ring. After the seventh ring is finished, once more join to the first picot of the center ring, and cut the thread.



EDGING

INSERTION MEDALLION

BASKETRY

BY GRACE LEE KNELL

BASKETRY, probably the oldest craft known, is one of the commonest as well as most useful of the domestic arts to-day, and is one of the most interesting crafts taught in our public schools. Men and women in the home, as well as children in the schools, become so fascinated with this delightful work that it is with much unwillingness they put aside an unfinished basket to wait impatiently for the next lesson.

Primitive tribes wove baskets of roots, and twigs, and palms. To make them water-tight, these people lined them with clay or mud, which when dried in the sun shrank away from the basket, forming a bowl of the same shape, and thus we see the origin of pottery.

There probably never was a tribe of people who did not make and use some kind of baskets. The Indian women worked for weeks or months on a single basket made of very fine roots, or twigs, or grasses. The South American Indians used palms, while the Negoes of South Africa used reeds and roots. The Chinese and Japanese are most skillful in the use of bamboo.

The work is easily learned, but to produce beautiful forms which are also strong and durable requires patience and perseverance. As the eye must be trained to recognize the symmetrical form, so the hand must follow the direction of the mind. One should work with care and accuracy, and the finished basket will be the result of the effort.

The tools needed for making reed baskets are:

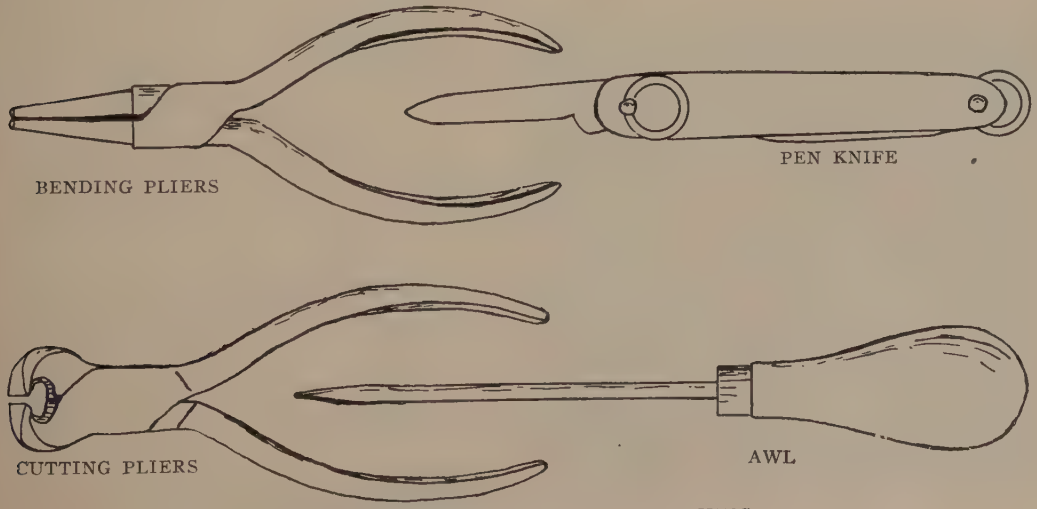
A tape measure or ruler to measure length of spokes.

A pair of clippers, or cutting pliers, to cut the reeds.

A pair of round-nosed bending pliers, to pinch the spokes before making a sharp turn.

An awl with a rounded end, to force an opening for inserting reeds.

A small knife, to cut slits, and to sharpen the reeds.



TOOLS NECESSARY FOR BASKET WEAVING

A small board (7 or 8 inches square), to lay the reeds on when cutting slits.

A pan large enough to hold sufficient water to soak the reeds.

The pliers, awl, and knife can be purchased at any hardware store. Round reeds of prime quality can be purchased at school supply houses; also from rattan and reed manufacturing companies, in one, five, ten and fifty pound bundles. They vary in size from No. 1, the smallest, to No. 7, which is about the size of an ordinary lead pencil.

A SMALL ROUND MAT

Materials:

8 pieces of No. 4 reed, 18 inches long, for the spokes.

1 piece of No. 4 reed, 10 inches long, for the odd spoke.

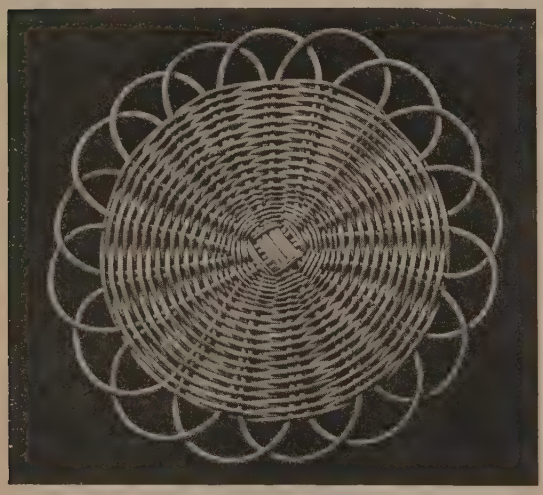
1 No. 1 reed, for the first weaver.

3 or 4 No. 2 weavers.

Directions:

1. Wind the No. 1 weaver, and each of the No. 2 weavers into rings about 5 or 6 inches across. Soak these weavers and the spokes in warm water for 10 minutes. This will make them soft and pliable.

2. With the knife cut a slit 1 inch long, in the middle of one of the 18-inch spokes (Fig. 2). Slip four of the 18-inch spokes through this slit (Fig. 3). Be sure to cross them in the middle.



A SMALL ROUND MAT

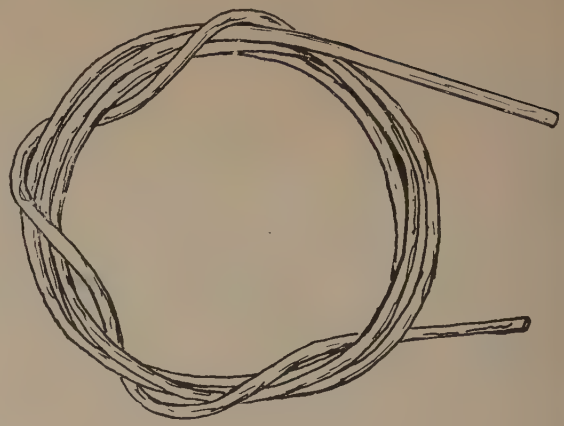


FIG. 1

3. Cut a slit in the middle of each of the other three spokes and slip them on the four spokes shown in Fig. 4.

FIG. 2

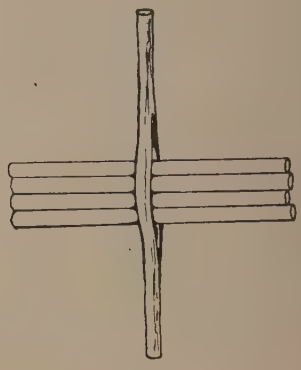


FIG. 3

4. The spokes which are slit must be held vertical. Insert the odd spoke in the lower left corner, and the No. 1 weaver in the upper right corner (Fig. 5).

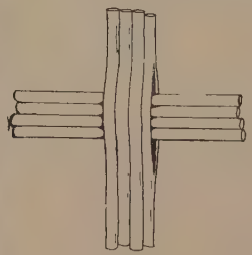


FIG. 4

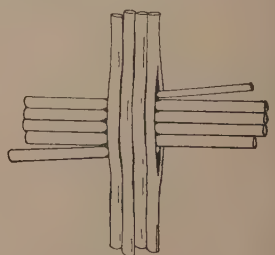


FIG. 5

5. Bring the weaver down, behind the horizontal spokes, and across over the vertical spokes (Fig. 6). Now bring it up, behind

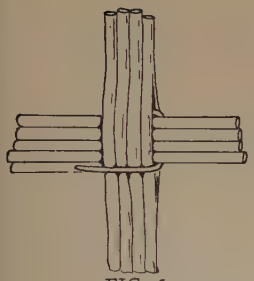


FIG. 6

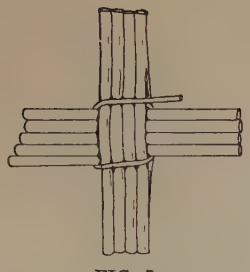


FIG. 7

the horizontal spokes, and across over the vertical spokes (Fig. 7).

6. You have now gone around the center once. Make the second round exactly like the first (Figs. 8 and 9).

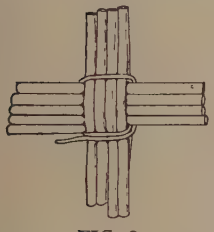


FIG. 8

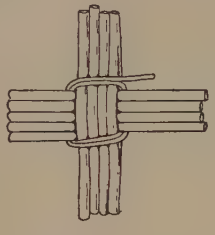


FIG. 9

7. Now bring the weaver from the upper right corner to the lower left corner, behind the spokes (Fig. 10).

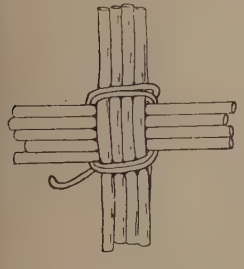


FIG. 10

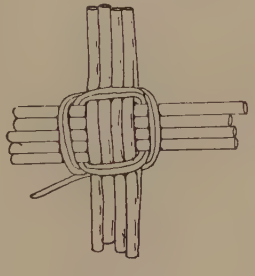


FIG. 11

8. Bring the weaver up, over the horizontal spokes, across behind the vertical spokes, then down, over the horizontal spokes, and across, behind the vertical spokes. Make another round exactly like this (Fig. 11).
9. The weaver is now in the lower left corner, and the center of the mat is made. See that the spokes are close together, and the weaver is firmly pulled on these first four rounds.
10. Now bring the weaver over the odd spoke. Separate each group of four spokes into groups of two spokes each. Weave under the first two horizontal spokes, over the next two; under the first two vertical spokes, over the next two; under the next two horizontal spokes, over the next two; under the next two vertical spokes, and over the next two. You have made one round of weaving. To make the second round weave under the odd spoke, over the two horizontal spokes, then under the next two; over the two vertical spokes, under the next two, and so on. Continue until you have made eight rounds, that is, four under and four over every pair of spokes (Figs. 12 and 13).

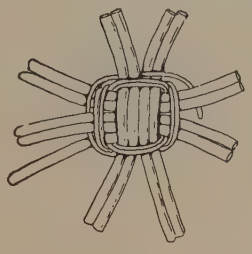


FIG. 12

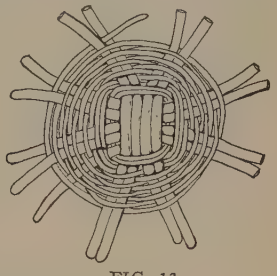


FIG. 13

11. At the beginning of the ninth round separate the pairs of spokes into single spokes. Weave over the odd spoke, then under and over every single spoke until the No. 1 weaver is used. Let the spokes radiate from the center, and keep them separated evenly. Try to keep the weaving perfectly flat.
12. Fasten the end of the weaver by pushing it down into the weaving back of and at the right of a spoke (Fig. 14).
13. Now use a No. 2 weaver. Push its end down into the weaving at the left, and back of the same spoke where you fastened the

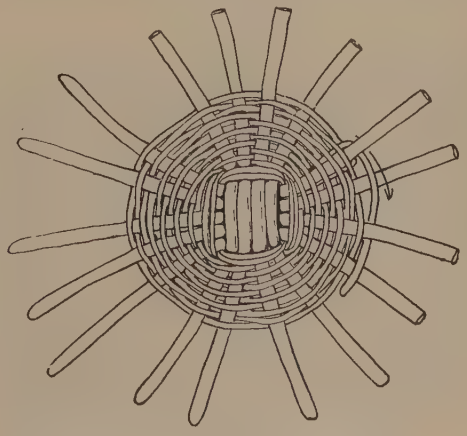


FIG. 14

No. 1 weaver. Continue single weaving (under and over every single spoke) until the mat measures 5½ inches in diameter.

14. Now soak the mat for several minutes, to make the spokes pliable.
15. Cut off the spokes about 5 inches beyond the weaving. Make the open edge as follows: Push the end of a spoke down into the weaving beside the second spoke at its left. Fasten the end of each spoke in turn down into the weaving in this way. (See picture of the completed mat.)

A SMALL BASKET WITH OPEN EDGE

Materials:

8 pieces No. 4 reed, 24 inches long, for the spokes.
1 piece No. 4 reed, 13 inches long, for the odd spoke.
1 No. 1 reed, for the first weaver.
1 No. 2 reed for the second weaver.
3 No. 3 weavers.

Directions:

1. Wind the weavers and soak them, with the spokes, for 10 minutes in warm water.
2. With the small knife cut a slit, 1 inch long, in the middle of one of the 24-inch spokes. Slip four of the 24-inch spokes through this slit (Fig. 3).
3. Cut a slit in the middle of each of the remaining 24-inch spokes, and slip them on the group of four spokes, with the first one. You have four spokes slipped through four spokes. Be sure to make them cross exactly in the middle (Fig. 4).
4. Insert the odd spoke in the lower left corner, and the No. 1 weaver in the upper right corner (Fig. 5).
5. Bring the weaver down behind the group of four horizontal spokes, across over the vertical spokes, up behind the horizontal spokes, and across over the vertical spokes (Figs. 6 and 7).
6. You have now completed the first round. Make the second round exactly like the first (Figs. 8 and 9).
7. Bring the weaver from the upper right corner to the lower left corner behind the spokes (Fig. 10).
8. Weave up over the group of 5 horizontal spokes across behind the vertical spokes, down over the horizontal spokes and across behind the vertical spokes. Make another round exactly like this one (Fig. 11).
9. The weaver is now in the lower left corner. Weave over the odd spoke. Separate each group of four spokes into two groups of two spokes each. Weave under the first group, over the next group, and so on until you have completed eight rounds, that is, four over and four under every group of two spokes. The odd spoke must be used alone. Do not use it with any other spoke to make a group.
10. Now separate the groups into single spokes. Weave over the odd spoke, then under and over every single spoke until the No. 1 weaver is used. Fasten its end down into the weaving at the right of and behind the spoke.
11. Start the No. 2 weaver back of the same spoke, and continue single weave until the disk measures 4½ inches in diameter. Keep the weaving perfectly flat, and the spokes evenly separated.
12. Soak the disk until the reeds are soft and very pliable. When the No. 2 weaver is used, start a No. 3 weaver and continue single weave, bending the spokes to make the side of the basket. To shape the side, weave as follows: Hold the disk in the left hand, with the diagonal weave in the center turned away from you. This diagonal reed always comes on the inside of the basket. The outside of the basket is always held toward the worker. As you weave press away from you every other spoke, that is, the spoke which the weaver comes over, and pull the weaver tightly. The spokes will gradually be turned away, all at the same angle.
13. Allow the spokes to flare a little. Weave the side 2½ inches high. The diameter at the top should be 6½ inches.
14. Make an open edge as follows: Soak the

A SMALL BASKET WITH OPEN EDGE

spokes until they are pliable. Cut them off 6 inches above the weaving. Push the end of each spoke down into the weaving beside the second spoke is at its left. Push the ends down to the bottom of the basket. The edge should look just like the edge of the mat.

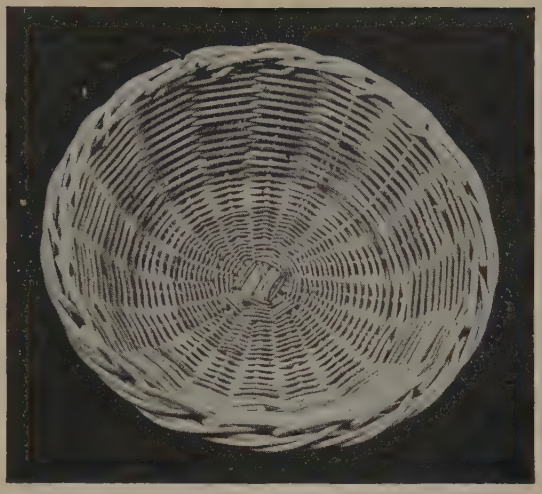
A SMALL BASKET WITH WOVEN EDGE

Materials:

8 pieces No. 4 reed, 30 inches long, for spokes.
1 piece No. 4 reed, 16 inches long, for the odd spoke.
1 No. 1 weaver.
1 No. 2 weaver.
5 or 6 No. 3 weavers.

Directions: Soak the spokes and weavers for 10 minutes.

1. Cut a slit about one inch long in the middle of four of the 30-inch spokes, and slip the other four 30-inch spokes through them, in the same way as you began the mat. Be sure that the vertical spokes cross the horizontal spokes exactly in the middle.
2. Slip the odd spoke in the lower left corner, and start the No. 1 weaver in the upper right corner (Fig. 4).
3. Weave the center just as you made the center of the mat, taking the No. 2 weaver when the No. 1 weaver is used. Keep the weaving perfectly flat, and continue until the disk measures 5 inches in diameter.
4. Now put your work in a pan of water, and allow the spokes to soak until they are soft and pliable. This will require at least 5 minutes.
5. Take a No. 3 weaver when the No. 2 weaver is entirely used. As you continue weaving, gradually bend the spokes away from you, and pull the weaver tight. Continue bending the spokes until you have a shallow bowl which measures about 7 inches across the top, and from the center to the edge of the weaving measures 4½ inches on the outside.



A SMALL BASKET WITH WOVEN EDGE

6. The spokes now stand about 10 inches above the weaving. Soak them until they are pliable. With the bending pliers pinch each spoke just above the weaving. This must be done carefully. With the pliers pointing directly toward the center of the basket, and grasping the spoke just above the weaving, press the handles firmly together and crush the spoke.
7. The woven edge is made in three rounds:
   (a) Lay each spoke back of the next spoke at the right, and outside the basket (Fig. 15).
   (b) Lay each spoke over the next two spokes at the right, and down on the basket (Fig. 16).
   (c) Lay each spoke up, over the next two at the right, and push the end through the edge just at the left of the place where a spoke was pinched. Pull every end through the edge to the inside of the basket (Fig. 17).

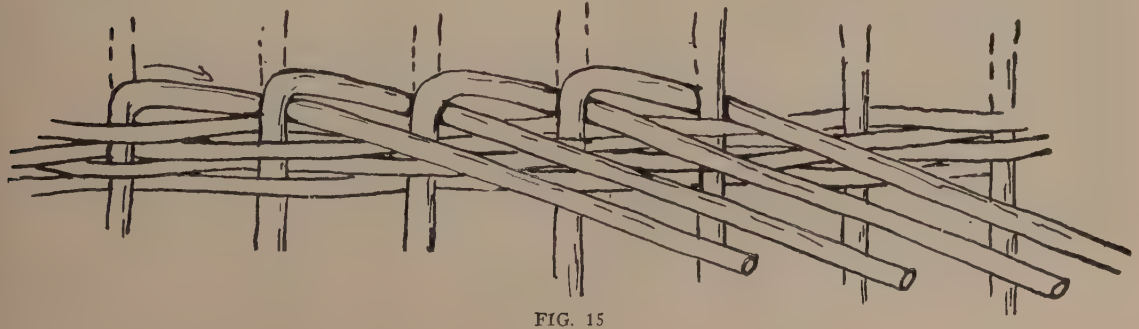


FIG. 15

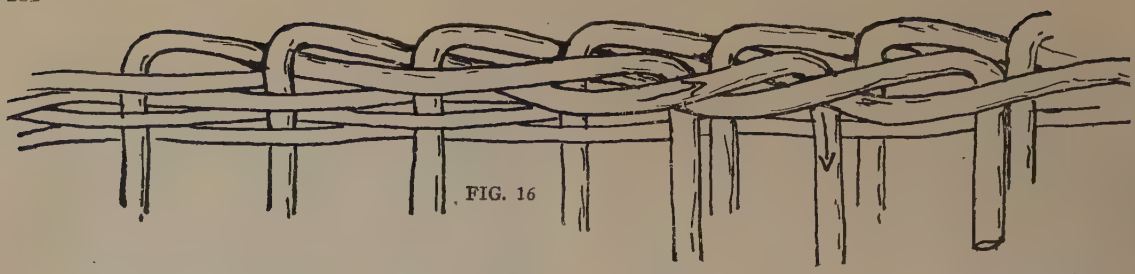


FIG. 16

Dash lines (see Fig. 17) show ends of spokes after second round has been made. Heavy lines show these ends laid up, over the next two to complete the woven edge.

8. Trim the ends of the spokes even on the inside of the basket. Leave each end just long enough to rest against a spoke.

A BASKET FOR CHRISTMAS NUTS

Materials:

8 pieces No. 4 reed, 32 inches long, for spokes.
1 piece No. 4 reed, 17 inches long, for the odd spoke.
1 No. 1 weaver.
1 No. 2 weaver.
Several No. 3 weavers.

Directions: Soak the spokes and weavers for 10 minutes.

1. Cut a slit, 1 inch long, in four of the 32-inch spokes, and slip the other four 32-inch spokes through them. Be careful to have them cross exactly in the middle.
2. Insert the odd spoke in the lower left corner, and the No. 1 weaver in the upper right corner.
3. Make the center like the center of the mat, and continue with the No. 1, No. 2, and then the No. 3 weavers. Weave the bottom of the basket 5½ inches in diameter.
4. Soak the spokes until they are pliable. Continue weaving and bending the spokes away from you until you have a shallow bowl which measures about 7½ inches across the top.
5. Soak the spokes, and pinch them with the bending pliers.
6. Make a woven edge in three rounds as follows:
   (a) Lay each spoke back of the next spoke at the right, and outside the basket.
   (b) Lay each spoke over the next two at the right, and down on the basket.
   (c) Lay each spoke up, over the next two at the right, and push the end through the edge just at the left of the place where a spoke was pinched. Trim the ends of the spokes on the inside of the basket.
7. For the handle, cut three pieces of No. 5 reed, 18 inches long. Sharpen both ends of these reeds. Hold the three pieces together as one reed, and push the ends down into the weaving on opposite sides of the basket. If you find this very difficult, put one reed in at a time, but be sure to have the three ends in at the same place, at the left of a spoke. (See Fig. 18.)
8. Wrap the handle with a long No. 2 reed, as follows:
   (a) Insert the end of the No. 2 weaver between the third and fourth rows of weaving from the top, and at the right of the spoke. Push this end in 3 or 4 inches, and weave it out and in, at the left, over one or two spokes, to fasten it securely.
   (b) Now wrap the long end (on the outside) up, over the handle from right to left, and continue, making the twists come about 1½ inches apart, to the opposite side of the basket.
   (c) Push the weaver from the outside, in, at the right of the handle spokes, and

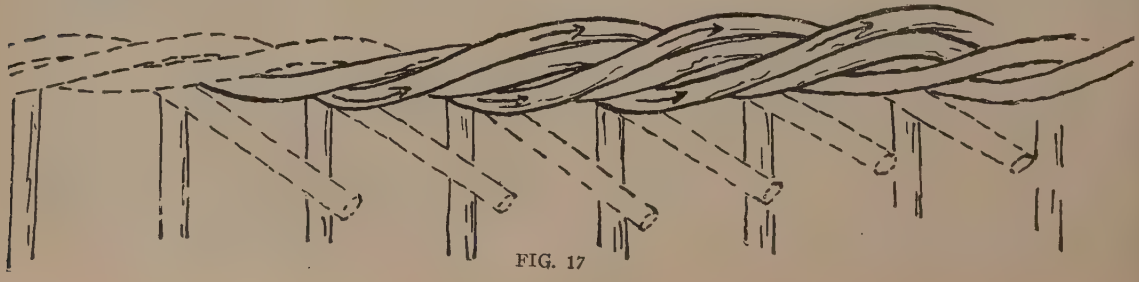


FIG. 17

A BASKET FOR CHRISTMAS NUTS

between the third and fourth rows of weaving. Then bring it from the inside, out, at the left of the same spokes, and between the same rows of weaving.

(d) Now lay it parallel with the first twist on the handle, and wrap it back to the opposite side of the basket. Push the end from the outside, in, at the right of the spokes, and between the third and fourth rows of weaving.

(e) Bring it from the inside, out, at the left of the spoke, and wrap it back again, parallel with the two twists, already made, and continue, back and forth, until the spokes are almost covered.

(f) Fasten the weaver by weaving it in and out over a spoke. Trim the ends.

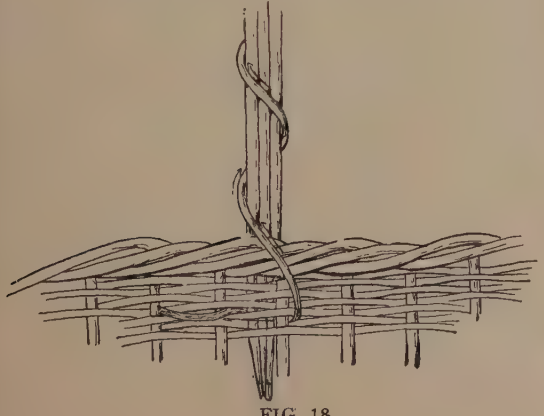


FIG. 18

Fig. 18 indicates how the handle spokes are inserted and are to be wrapped. The arrows show the direction of the weaver as it is wrapped around the spokes.

A CANDY BASKET

Materials:

8 pieces No. 3 reed, 27 inches long, for the spokes.
1 piece No. 3 reed, 14 inches long, for the odd spoke.
1 No. 1 weaver
Several No. 2 weavers.

Directions: Soak the spokes and weavers for 10 minutes.

1. Cut a slit, ½ inch long, in four of the 27-inch spokes and slip the other four 27-inch spokes through them. Be sure to cross them in the middle.
2. Insert the odd spoke in the lower left corner, and the No. 1 weaver in the upper right corner.
3. Make the center like the center of the mat, and continue to weave until the disk measures 2½ inches in diameter.
4. Soak the spokes until they are soft and pliable. Continue single weave, gradually bending the spokes away from you to make a shallow bowl. On the outside of the bas-

A CANDY BASKET

ket 3 inches from the center the circumference should be about 17 inches.

5. Now bend the spokes in, and pull the weaver tightly to keep the spokes in place. On the outside measure 4½ inches from the center, and stop weaving. The diameter at the top should be 4 inches.
6. Soak the spokes. Pinch them with the bending pliers, just above the weaving.
7. Make a woven edge as follows:
   (a) Lay each spoke back of the next one at the right, and outside the basket.
   (b) Lay each spoke over the next two at the right, and down on the basket.
   (c) Lay each spoke up, over the next two spokes, and push the end through the edge at the left of the place where a spoke was pinched.
8. Trim all ends on the inside of the basket.
9. For the handle, cut two pieces of No. 5 reed, 18 inches long. Sharpen both ends of these handle spokes, and insert them on opposite sides of the basket, just below the widest part. Push the ends well into the weaving. Wrap these two, as one, with a long No. 2 reed.

A BASKET FOR CHRISTMAS CAKES

Materials:

8 pieces No. 4 reed, 25 inches long, for spokes.
1 piece No. 4 reed, 13 inches long, for the odd spoke.
8 pieces No. 4 reed, 11 inches long, for added spokes.
1 No. 1 weaver.
1 No. 2 weaver.
Several No. 3 weavers.

Directions: Soak the spokes and weavers for 10 minutes.

1. Cut a slit, 1 inch long, in four of the 25-inch spokes, and slip the other four 25-inch spokes through them. Be sure to cross them in the middle.
2. Insert the odd spoke in the lower left corner, and the No. 1 weaver in the upper right corner.
3. Make the center exactly like the center of the mat, and continue with the No. 2 weaver, then the No. 3 weavers, until the disk measures 5 inches in diameter.
4. Sharpen the 11-inch spokes on one end, and insert them as shown in Fig. 19. Begin with the second spoke at the right of the odd spoke, and add a spoke to every other original spoke. Push the ends down into the weaving as far as possible.
5. Separate the spokes and weave five rounds single weave (under and over every single spoke).
6. Now use two weavers. Hold them together as one weaver, and weave five rounds double weave, bending the spokes away from you just a little. The double weave must begin and end at the odd spoke.
7. Now take one weaver, and weave 12 rounds single weave.
8. Cut off the spokes 6 inches beyond the weaving. Soak them.
9. Make an open edge like the edge of the mat.
10. For the handle cut two pieces of No. 5 reed, 23 inches long.
    (a) Insert the ends (which must be sharpened) on opposite sides of the basket. Push the ends down into the weaving. Press these handle spokes down, and allow them to flare a little beyond the sides of the basket.
    (b) Hold the two handle spokes together and wrap them with a long No. 2 reed, just as you wrapped the handle of the Christmas nut basket.
11. When this little cake basket is perfectly dry, paint it with clear white shellac. This will make the reeds hard, and strong.

A BASKET FOR CHRISTMAS CAKES

A SMALL ROUND TRAY

Materials:

8 pieces of No. 5 reed, 40 inches long, for the spokes.
1 piece of No. 5 reed, 21 inches long, for the odd spoke.
16 pieces of No. 5 reed, 19 inches long, for the added spokes.
1 No. 1 weaver.
3 or 4 No. 2 weavers.
Many No. 3 weavers.

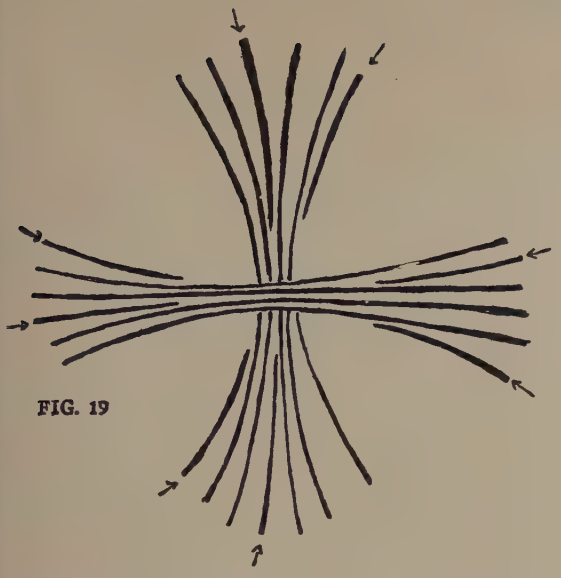


FIG. 19

Directions: Soak the spokes and weavers for 10 minutes.

1. Cut a slit, 1 inch long, in the middle of four of the 40-inch spokes, and slip the other four 40-inch spokes through them. Make them cross in the middle.
2. Insert the odd spoke in the lower left corner, and the No. 1 weaver in the upper right corner.
3. Make the center like the center of the mat. Use the No. 1 weaver, then the three or four No. 2 weavers. Keep your work perfectly flat, and make the disk 5 inches in diameter.
4. Sharpen one end of each of the 19-inch spokes, and insert one at the right of every original spoke, except the odd spoke. Push the sharpened ends well into the weaving. You now have 33 spokes.
5. Separate the spokes, and weave single weave, until the diameter is 8 inches. Now use the No. 3 weavers, and continue single weave to 13 inches in diameter.
6. Soak the spokes for 5 minutes. With the bending pliers pinch each spoke parallel to the weaving, that is, so it will bend directly away from you, or at right angles to the weaving.
7. Now make one round of triple weave thus: Start three weavers behind three successive spokes. Lay the first weaver over the other two, and weave it back of the third spoke at the right, and outside. Lay the second weaver over the next two, and back of the third spoke at its right. Continue "over two and back of the next," until you have made one round.
8. Make another round of triple weave, bending the spokes directly away from you. Pull each weaver tight to hold the spokes in place.
9. Now place the tray on a table and continue triple weave, holding the spokes so that the sides of the tray will be perfectly straight. Make the tray about 2 inches deep.
10. Now soak the spokes for 5 minutes. Pinch them. Make a woven edge as follows:
    (a) Lay each spoke back of the next spoke at the right, and out.
    (b) Lay each spoke over the next two, and down on the basket.
    (c) Lay each spoke up, over the next two, and down into the weaving just at the left of the place where a spoke was pinched.
11. There should be no loose ends of weavers. All ends should be fastened into the weaving.
12. For the handles, cut 6 pieces of No. 6 reed, 10 inches long. Soak them well. Sharpen both ends of these handle spokes.
    (a) Hold three of them together, as one, and insert one end into the weaving at the left of a spoke. Push the ends down to the bottom of the tray.
    (b) Insert the other end of these three, as one, down into the weaving four spokes to the left, that is, leaving three spokes between the ends of the handle.
    (c) Push the end of a No. 3 weaver from

A SMALL ROUND TRAY

the outside, in, at the right of the spoke, and between the third and fourth rows of weaving. Fasten the end by weaving it out, in, and out, over two or three spokes.

(d) Wrap the long end over the handle from right to left, and make four twists to the other side.

(e) Push the end of the weaver from the outside, in, at the right of the spoke, and between the third and fourth rows of weaving. Pull it entirely through. Now push the end from the inside, out, at the left of the same spoke, and between the same rows of weaving. Pull it through. Make it firm.

(f) Bring it up parallel to the first twist, and wrap it back to the other end. Continue wrapping, back and forth, until the handle spokes are completely covered. Fasten the end of the weaver, and cut it on the outside.

13. Make the other handle on the opposite side of the tray.

A BASKET FOR FLOWERS WITH SHORT STEMS

Materials:

8 pieces of No. 4 reed, 30 inches long, for the spokes.
1 piece of No. 4 reed, 16 inches long, for the odd spoke.
1 No. 1 weaver.
1 No. 2 weaver.
Many No. 3 weavers.

Directions: Soak the spokes and weavers for 10 minutes.

A BASKET FOR FLOWERS WITH SHORT STEMS

1. Cut slits in the middle of four of the 30-inch spokes, and slip the other four 30-inch spokes through them. Insert the odd spoke in the lower left corner, and the No. 1 weaver in the upper right corner.
2. Make the center exactly like the center of the mat, and weave until the disk measures 4½ inches in diameter.
3. Now soak the spokes for 5 minutes, then pinch them with the bending pliers so they will turn directly away from you.
4. Make one round of triple weave (see directions for triple weave in the lesson on the round tray).
5. Weave 2 inches of single weave, bending the spokes away from you a little (see picture).
6. Weave another inch of single weave, bending the spokes straight up, then bend the spokes in and continue weaving, until the diameter at the top is 6 inches.
7. Soak the spokes, and pinch them. Make a woven edge like the edge of the candy basket.
8. For the handle, cut two No. 5 reeds, 23 inches long. Soak them, then sharpen both ends. Insert the ends on opposite sides of the basket, just below the widest part, one at the right of a spoke, and the other at the left of the next spoke to the left (see picture). Insert the end of a No. 3 reed three rows lower than the place where the right hand handle spoke is inserted, and at its right. Fasten the end by weaving it out and in, over a spoke. Make the first twist over this right hand handle spoke, then make the other twist over the two handle spokes held together across to the other side of the basket. Make one twist around the right hand handle spoke, then push the end from the outside, in, at the right of the spoke, and three rows lower than the place where the handle spoke is inserted. Bring the end out at the left of the same spoke, and between the same rows of weaving. Wrap it back to the opposite side of the basket, then back again, making three twists in a group across the handle. Fasten the end, and cut it off on the inside of the basket. Start another No. 3 reed at the right of the left hand handle spoke and wrap it around the handle, back and forth, making three twists, which with the first three, will cover the handle, as shown in the picture.

This basket, filled with sweet peas, or nasturtiums, will make a beautiful picture wherever it is placed.

WOODWORK

Edited by

HARRIS W. MOORE

THE PROPER HANDLING OF TOOLS*

BY A. NEELY HALL

BEFORE using a tool be sure you understand the proper handling of it, for there is probably nothing more easily injured than an edge tool in a sharpened condition. An inexperienced person is very apt to dull or nick a tool by striking its edge against nails, or by using it for purposes other than what it was made for. For this reason a carpenter is very apt to refuse a boy, or any amateur for that matter, the use of his tools, and he is right in doing so. Just imagine the amount of work it makes for him to put the tools in shape after they have been returned in all sorts of conditions. A little rubbing on the oil-stone, with an occasional grinding, is all his tools require when he is using them, but to remove nicks made by his young friends wastes too much of his valuable time.

The following directions, together with the illustrations, should make the handling of your tools perfectly clear, and you will find among these a number of hints as to the care of tools that should be carefully adhered to in order that you may keep them in good condition.

Saws.—A boy can get along with two saws, a cross-cut saw for general use and a compass saw for finer work, such as circular sawing, and cutting thin wood where a large saw would be too coarse and apt to split the work. But you will often have need of a rip saw, hack saw, and bracket saw. You can add them to your outfit as your money permits.

The cross-cut saw is, of course, intended for cutting across the grain, while the rip saw is for cutting with the grain, or ripping. The former saw can be used for rip-sawing, but the operation is much slower, and when you have much of it to do, as in ripping a six-foot board, for instance, you will find the work tedious.

The rip saw is not fit for cross-cutting, as it leaves the cut fibers in a very rough condition.

The difference in these two saws lies in the shape of their teeth. This can be seen by picking them up and examining their cutting edges. You

FIGURE 1—TEETH AND EDGE OF CROSS-CUT SAW

will find the teeth are bent out of line, the first to the right side and the next to the left. This is known as the "set" of the teeth, and the quality of your work will depend largely upon the care

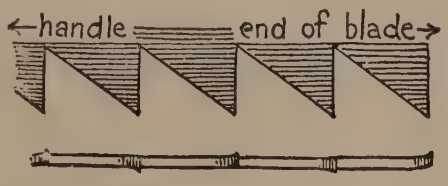


FIGURE 2—TEETH AND EDGE OF RIP SAW

with which the teeth have been sharpened and set. At first you may confuse these two saws, but if you will notice that the teeth of the cross-cut saw comes to sharp points and are beveled on the sides, while those of the rip saw are not sharpened on the sides, and instead of being pointed on the ends are chisel-shaped (see Figs. 1 and 2), you will have little trouble in distinguishing them.

Sawing.—Small pieces may be sawed while

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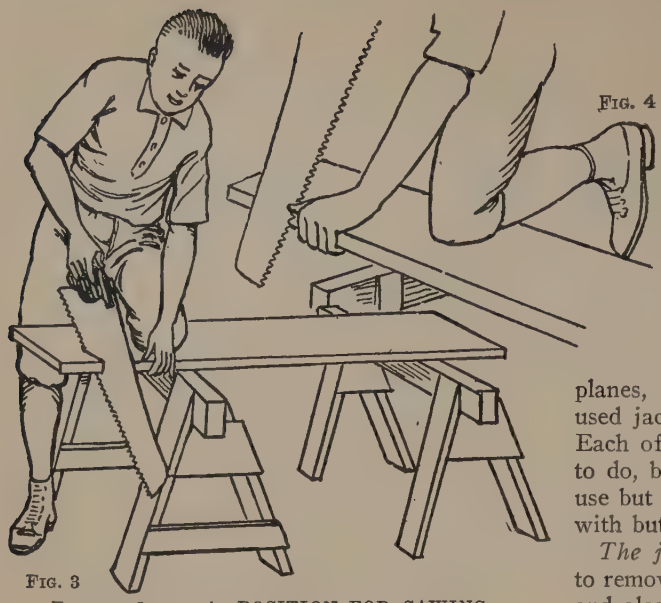


FIG. 4

FIG. 3

FIGURES 3 AND 4—POSITION FOR SAWING

held in the vice, but, as a rule, large work is placed across a couple of horses. It is generally the most convenient way. Grasp the saw in the right hand, and take the position shown in Fig. 3, with the left knee upon the work to hold it in place, and the left hand at the edge of the board. The thumb should be pressed against the saw-blade to guide it until the cut has been well started, as Shown in Fig. 4. Without the aid of the thumb the saw is liable to slip off the mark and make an ugly cut in the wood. First use a few short strokes until the saw has started to cut. Then use a long, steady stroke, putting all the pressure upon the down stroke. Be careful to keep the saw to the line and in a perpendicular position, so that the cut will be square on all sides. If it starts to run away from the line, a slight twist of the blade will return it.

When a board has been sawed nearly in two, remove the weight of your knee from it, and hold the board with the left hand to prevent it from splitting off.

Fig. 5 shows the correct position for using

The back-saw, which is intended for more delicate work than the larger saw, such as can be sawed on the bench-hook or in the miter-box. It makes a finer cut, its teeth being smaller and more closely set.

The blades of

The compass and gig saws are small and narrow, the former being used for circular cutting, as the name would imply, while the latter is employed in cutting very thin wood and in making delicate curves. The blades of these saws, especially the latter, are easily broken, and must be handled with care. The teeth are arranged so as to cut with and against the grain. The slot made by removing the fiber of the wood in sawing is known as

A kerf. The term is used a good deal in carpenter work, so it is well to know its meaning.

The carpenter of to-day is generally supplied with all manner of planes—rabbeting planes, beading planes, circular planes, plows, etc.—besides the more commonly used jack plane, fore plane, and smoothing plane. Each of these planes has a special form of work to do, but ordinarily a boy will have occasion to use but the last three named, and many get along with but a jack and a smoothing plane.

The jack plane is the plane you will first need to remove the rough surface of undressed lumber, and also to reduce quickly the thickness of wood. The cutting edge of the blade is ground so as to gouge the wood, removing thick shavings, but leaving ridges and hollows which must afterward be removed by a fore plane or smoothing plane. There is one trouble in using the smoothing plane for this operation, however, and that lies in the danger of it following the hollows formed by the jack plane, and making a smooth but uneven surface.

The fore plane, on the other hand, has a long enough stock to prevent the blade from cutting the lower portions until the high portions have been removed. Although a fore plane can be used alone for smoothing large work, it is more convenient to finish up with *the smoothing plane.*

The Stanley iron plane, shown in Fig. 6, is a great improvement over the old-style wooden ones, and is the most popular plane used to-day. It is more easily handled, as its iron is quickly put in place and adjusted. The illustration gives the names of the various parts. The cap (B) is screwed to the plane-iron (A), and both are held in the stock (F) by means of the

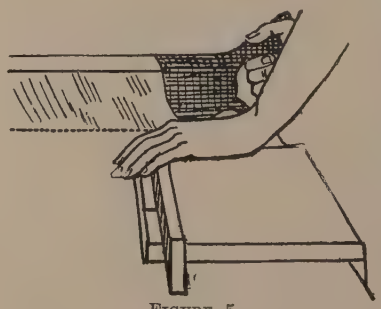


FIGURE 5
POSITION FOR USING BACK-SAW

clamp on the end of the wedge (C). The thumb-screw (D) regulates the degrees of fineness of the plane-iron, while the lever (E), which moves from side to side, straightens the position of the iron. The base of the stock is known as the sole, or face.

The Bailey plane is somewhat similar to the Stanley, the upper portion being of iron, with screw adjustment, but the base being of wood.

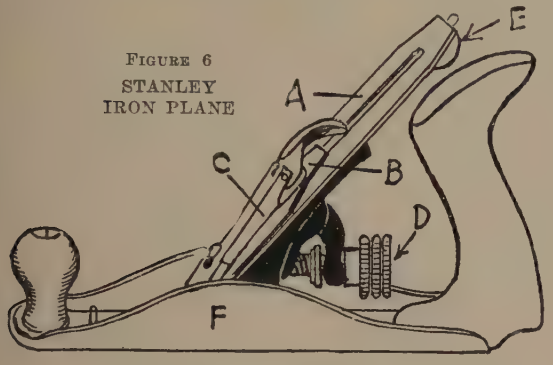


FIGURE 6
STANLEY
IRON PLANE

Its cost is much less than that of the entire iron plane, and you will probably find it as satisfactory if you do not care to spend the additional amount for the Stanley plane.

For planing, take the position shown in Fig. 7, with the left foot a little in advance of the right, the right hand grasping the handle of the plane and the left holding the knob on the fore part of the stock. Use a long, steady sweep, and bear with equal pressure from the beginning of a stroke to the end, to avoid the hollows that are so easily made by taking shavings of different thicknesses. Do not drag the plane-iron over the work in returning it for another stroke, as it will dull its edge.

You will often come across wood with a crooked grain, which runs diagonally through the piece, terminating at the surface. There is a right way and a wrong way in planing this, just as there are two ways of stroking a cat's back, one smoothing the surface, while the other roughens it. When you find a piece of wood with this kind of uncertain grain, you will probably have to change the direction of your planing a number of times before finishing the surface, in order to plane with the grain.

In planing end-wood, you will have trouble in preventing the corners of the piece from splitting off unless it is placed in the vice in front of another block of wood, the planing being done toward the block. Or one corner may be chamfered with the chisel, as shown in Fig. 11.

Testing Work.—It is necessary to test work frequently while planing, in order to locate the high places and avoid taking off too much on the low places. This may be done by squinting one eye and holding the board on a level with the other eye, so that you can look down the length of it as in sighting a gun. The uneven places show up very plainly in this way.

Work is also tested by means of the try-square. Place the handle of the square against the edge of the work with the blade of the square extending across the planed surface, and move it the length of the board. Any irregularities in the surface will show themselves as the blade passes over them. In planing up a block of wood, plane up one side and, after proving it to be true, use it for the "tried edge," testing the other sides with the handle of the square pressed against its surface.

There are a number of forms of *Chisels,* but the only two classes you will probably ever be in need of are the firmer and framing chisels. The former are intended for hand use only, while the latter are used for heavier work, such as mortising, where it becomes necessary to use the mallet.

In using a firmer-chisel, the work should be placed in the vise or be otherwise held in position, that both hands may be kept upon the tool, the right hand grasping the upper end of the handle and doing the pushing, while the left hand holds the lower part of the handle and acts as a guide in working it.

Paring with the chisel consists in trimming a piece of wood to a given line. It is an operation very often resorted to in finishing the end of a piece of work instead of planing, and in trimming up a curved edge, such as is shown in Fig. 8. Here the dotted line represents the line of the finished end of a piece of work. The board is first placed in a vise and the wood removed to about one-quarter inch of this line with a compass saw following the curve of the line as nearly as possible. Then lay the

FIGURE 7—TAKE
THIS POSITION FOR PLANING

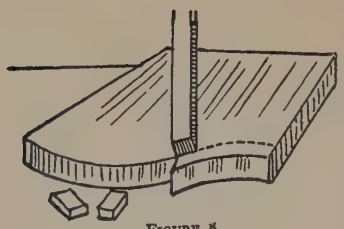


FIGURE 8

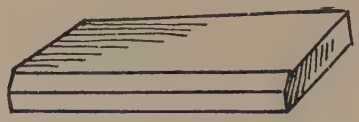


FIGURE 10

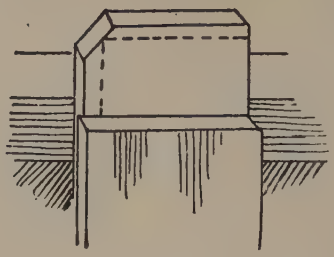


FIGURE 11

FIGURE 9

piece upon the bench-hook and pare to the line with the chisel, as shown in Fig. 8.

The chisel is often used to pare down the surface of a piece of work to a given line, as shown in Fig. 9.

The framing-chisel should be held in the left hand, and the blows dealt upon the handle with the mallet in the right hand. In handling the framing-chisel the bevel of the blade should be towards the work, which is just the opposite from that shown in Figs. 8 and 9. Unless this is done the chisel will not cut down squarely but will cut in under, as it cannot be guided as easily as the firmer-chisel can, with both hands to hold it.

Chamfering and beveling are somewhat similar operations. They consist in cutting the edges of a piece of wood, as shown in Figs. 10 and 11.

The corner of a block of wood is very often chamfered, when planing endwood, to prevent the wood from splintering. It can only be done, of course, before the adjoining side has been planed up, that a square corner can be obtained again when the work is finished.

The gouge is a chisel with a curved section, its use being for cutting grooves and curvatures in a piece of work where the chisel cannot be employed.

A draw-knife is very handy for quickly reducing the size of material and in rounding sticks. The blade is drawn toward you instead of being pushed, as in the case of a plane or chisel.

Boring.—Probably the only trouble you will have with the bit and bit-stock will be in holding the brace in a perfectly vertical position so as to bore a straight hole.

The center of the hole should first be located upon the work. Then, after selecting the right size of bit and securing it in the clutches of the bit-stock, grasp the handle of the stock with the right hand and place the left hand on the top knob. Set the point of the bit against the work and bore steadily until the point appears upon the opposite side. The bit should then be withdrawn and the rest of the hole bored from the other side. This prevents the fiber around the hole from splintering off, as it is likely to do when a hole is bored all the way through from one side. To bore a hole in a piece of work held in the vise, clamp a waste piece of wood in the vise with it, and bore straight through the work into the waste piece.

When boring hard wood or using large bits increased pressure is necessary to operate the brace and at the same time steady the bit. This can be obtained by allowing the chest to bear upon the top knob.

Holes two inches or more in diameter do not require a bit that size, for smaller holes can be bored and these trimmed to the required opening with a chisel or with the keyhole saw. Whatever style of bit-stock you buy, get one with a fair length of arm, as a good leverage cannot be obtained with a short one.

An automatic-drill is a handy tool to have in the shop. You have probably seen carpenters use it in drilling holes in hard wood, before driving in finishing nails or screws. It beats the awl and gimlet for speed, and is a tool which can be used in places where neither of these could be operated. The handle of the tool contains a number of sizes of drills.

This tool must be use with care, as the drills snap off very easily when the tool is handled roughly or twisted from side to side while boring a hole.

The hatchet is an indispensable tool, for it can be used for a good deal of your rough work, such as splitting and paring. It requires practice to handle one successfully, however. A misplaced blow will sometimes ruin your work, either by cutting into it or striking grain which runs off into the portion to be finished. With straight grained wood it is not so difficult to pare to a line with the hatchet. The wood should be removed to within less than an eighth of an inch of the line, as the work must be dressed up afterward with the plane.

It is well to have *a hammer* with a fairly heavy head for large work, and a lighter one with which to drive small nails.

Driving Nails.—The nail should first be held in position with the thumb and first two fingers, and given a few light raps with the hammer to start it. Then remove the fingers, and drive the nail home with steady blows being careful to hit the head squarely so it will not bend.

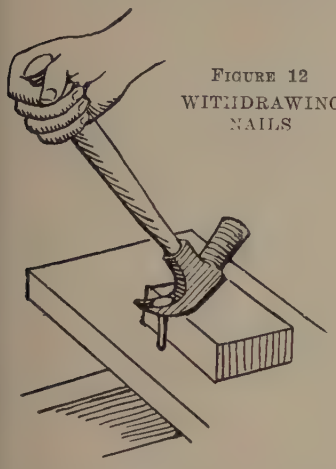


FIGURE 12
WITHDRAWING NAILS

Although a bent nail can be driven home with the proper stroke, it is generally easier and quicker to withdraw it and either hammer it out straight or use another.

A pair of pincers is handy for *withdrawing nails,* especially nails whose heads are too small to be gripped with a claw hammer; but for removing large nails a stronger leverage is necessary. This can be obtained as shown in Fig. 12. The head of the nail is gripped in the claw of the hammer and a block of wood placed beneath the head. The handle of the hammer is then pulled toward you, as shown in the illustration. The block, besides increasing the leverage, prevents the hammer-head from injuring the surface of your work, and makes it possible to withdraw the nail in a fairly straight condition.

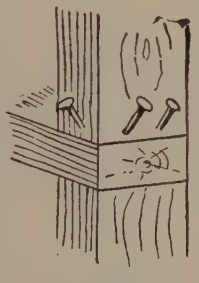


FIGURE 13
TOE-NAILING

Toe-nailing consists in driving nails diagonally into a piece of wood. It is used in fastening the ends of uprights, as shown in Fig. 13, where the nails cannot be driven in any other way and also where there is danger of a board springing. You will often find it convenient to use this form of nailing when the nails are too long to be driven straight into the work.

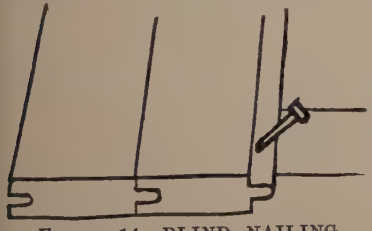


FIGURE 14—BLIND NAILING

Blind-nailing is a form of toe-nailing used on tongue and grooved boards in which the heads of the nails are concealed below the surface, as shown in Fig. 14.

Clinching.—When nails come through a piece of wood their ends should be clinched. This is done by having someone hold a hard surface, such as the head or blade of a hatchet, against the under side of the work, or by laying the hatchet down and resting the work upon it, while you drive the nail. The point of the nail will bend over when it strikes the hard surface and sink into the wood. This is the best method to use in fastening boards together with battens, in rough work, as the clinched nails act as rivets, preventing any possibility of the boards pulling apart.

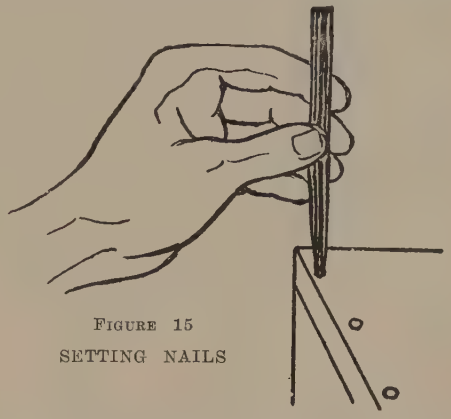


FIGURE 15
SETTING NAILS

Do not drive the head of a nail into a finished surface with the hammer, as you are likely to mar the wood in doing so. Leave this—the "setting" of the nails—until the piece of work has been put together. Then go over it and drive the heads below the surface with *the nail-set,* holding the tool as shown in Fig. 15. The holes made by the heads should be filled up with putty before the finish is put upon the wood.

Before driving nails into hard wood, holes should be made with the brad-awl or drill, to prevent them from splitting the wood, and to make it easier to drive them in without bending. The holes should be a trifle smaller than the nails. Always drill a hole before driving a nail into thin wood or near the edge of a piece.

A nail can be driven more easily if its point is rubbed over a piece of soap. This is something you should remember to do when nailing hard wood.

Nails.—Iron, galvanized-iron, wire, and copper nails are manufactured, but of these the wire nail is the most commonly used for all kinds of work, it being more easily handled, not so

liable to snap off, and there being less danger of splitting your work with it than with the iron nails.

You will notice the iron nails have two smooth sides and two rough ones. In using these it is necessary to drive them with the smooth sides parallel with the grain, otherwise they are sure to split the work.

Nails are classified according to their shape and gauge. The only kinds you will probably ever have occasion to use are the Common, or nail for all ordinary work; the Finishing-nail, with the small head used on finish work; and the Brad, or small-sized finishing-nail. You can buy these by calling for the length you require, but it is more businesslike to use the standard terms by which all carpenters know them.

The following table gives these terms, together with the length in inches:

2-Penny	Nails	(1 inch	long).
3	"	(1¼ inches	long).
4	"	(1½ "	").
5	"	(1¾ "	").
6	"	(2 "	").
7	"	(2¼ "	").
8	"	(2½ "	").
9	"	(2¾ "	").
10	"	(3 "	").
12	"	(3¼ "	").
16	"	(3½ "	").
20	"	(4 "	").
30	"	(4½ "	").
40	"	(5 "	").
50	"	(5½ "	").
60	"	(6 "	").

All nails longer than 3½ inches (20-penny to 60-penny inclusive) are known as spikes.

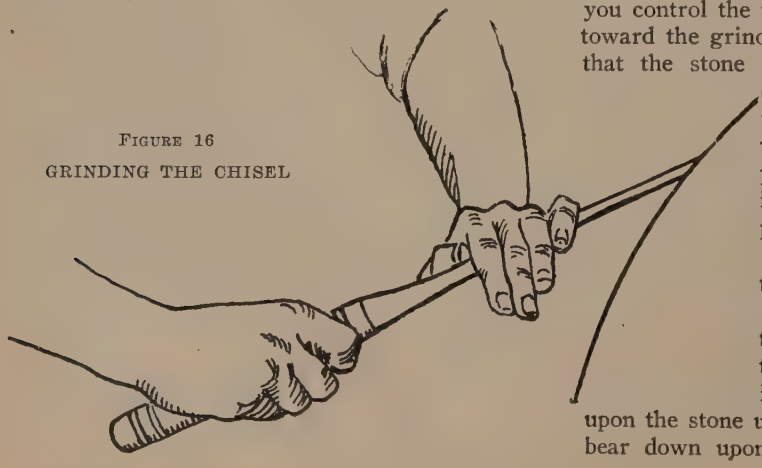


FIGURE 16
GRINDING THE CHISEL

It is desirable to have *a screwdriver* which will set in the clutches of your bit-stock, besides the ordinary kind, for it is more quickly operated, and screws can be driven in hard wood easier on account of the greater amount of leverage you get with it.

Holes should be drilled in hard wood before driving screws into it.

Screws are made with round and flat heads. The round-headed screw is a finishing screw, and its head is left exposed on the surface of the wood; but the flat-headed screw should be countersunk, that is, sunk below the surface. To do this you must drill a hole before driving in the screw with *the countersink,* which is a drill made to fit in the bit-stock, and bores a hole the shape and depth of the screw-head.

SHARPENING TOOLS

Be sure you understand the process of sharpening tools before you undertake to use the oilstones and grindstones.

Not all tools are sharpened alike, and you will need to know the different ways in order to get their cutting edges the right shape to serve their different purposes.

Grinding is the most difficult part of the work, and most boys have trouble with it. One fault lies in using the grindstone too frequently, grinding the edge of a tool when it requires only a little rubbing upon the oilstone to put it in shape, and thus wearing down the tool unnecessarily. Again, by not keeping the stone sufficiently wet, the heat produced by the friction takes the temper out of the steel, making it soft and useless until retempered.

If you have a stone with a crank arrangement, it will be necessary to have someone turn it while you control the tool. The stone should be turned toward the grinder and the tools held upward so that the stone grinds against the edge instead of from it. Move the tool sideways across the stone so as to wear it down evenly and help prevent the formation of ridges in the stone, which are very easily produced.

Fig. 16 shows the position to take in grinding.

Chisels.—Hold the handle of the tool in the right hand and rest the palm of the left hand upon its blade. Then lower the edge upon the stone until the bevel strikes it flatly, and bear down upon the blade with your left hand.

Continue the grinding until the bright line of the dull edge has disappeared and an invisible edge has been obtained. Stop when this point is reached, or the edge will become feathery and break off, necessitating regrinding. Grind upon the beveled edge only, and hold the tool in the same relative position, to prevent the bevel from becoming rounded. The angle of the bevel should be about twenty-five degrees. To keep this angle the same, it is desirable to have a rest, consisting of a board nailed to the frame of the stone, upon which to support the handle of the chisel.

Gouges and draw-knives are ground similarly, the former being rocked from side to side, in order to grind the curved bevel uniformly.

Plane irons are held with both hands, as shown in Fig. 17, and ground the same, except that the corners of the smoothing and fore plane irons are slightly rounded, while the edge of the jack-plane iron is a little higher at the corners than in the center, to give it the qualities for removing thick shavings. It is more difficult to keep the line between the bevel and upper part of the iron straight than in grinding chisels, on account of the wider blade.

Knives and hatchets are ground upon both sides of the blade.

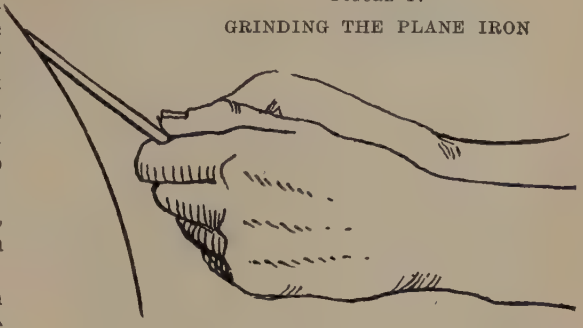
Of course, the edge of a tool is left in a very rough condition by the grindstone, and must be rubbed up on an oilstone before it is fit to cut with.

There are many makes of whetstones, many good ones and many worthless ones. Above all things, don't buy a cheap one, for it will be impossible to obtain keen edges upon it.

In rubbing up a plane-iron, grasp the end between the thumb and fingers of the right hand and place the palm of the left hand across the iron to bring the necessary pressure upon it (see Fig. 18).

FIGURE 17

GRINDING THE PLANE IRON



Instead of holding the blade on the stone at the angle of the bevel, tip it to an angle of about thirty-five degrees, or ten degrees more than that of the bevel. With it held in this position, rub it back and forth upon the stone with a rotary motion, making a second narrow bevel along the edge of the tool (see Fig. 19). Be careful to keep the blade in the same position, to prevent the bevels from becoming rounded. By exerting a steady upward pressure against the end of the tool with the right hand, and an equal downward pressure in the center of the blade with the left hand, this is easily accomplished.

The rough edge which appears on the back of the blade is removed by rubbing the flat side of the iron over the stone a few times. Care must be taken to keep the iron perfectly flat or a bevel will be formed.

A strop, consisting of a piece of leather fastened to a block of wood, should be used after the oilstone, to put a fine edge upon the tool. The tool is stropped in the same way as a razor is done.

Saws require sharpening but once in a great while if proper care is taken of them. When they do become dull, or need to be set, it is advisable for you to pay an experienced person to do the work rather than attempt it yourself.

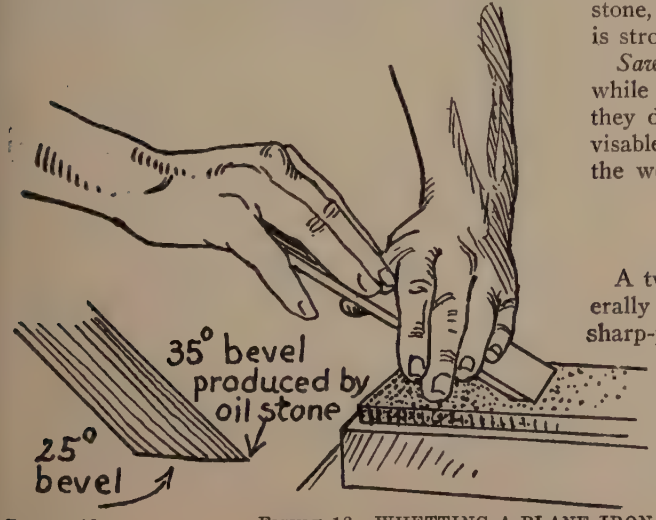


FIGURE 19 FIGURE 18—WHETTING A PLANE IRON

LAYING OUT WORK

A two-foot carpenter's folding-rule should generally be used in laying off measurements, and a sharp-pointed pencil or brad-awl to locate the points. To connect the points it is necessary to have a straight-edge—a steel framing-square (Fig. 23) for large boards and a smaller try-square (Fig. 20) for smaller pieces—and a pencil or knife.

A pencil may be used in connecting

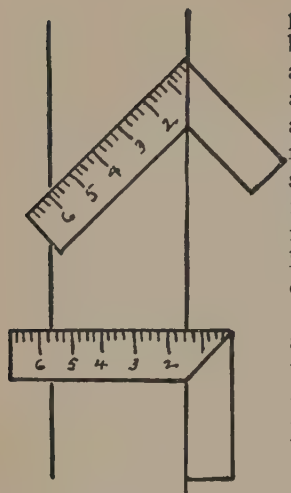


FIGURE 20

points upon rough work, but for greater accuracy a knife should be used, as it makes a thinner and clearer-cut line. In making knife-lines, the square must be held firmly, to prevent it from slipping and allowing the knife to run out of its course.

To draw lines across a board at right angles to one edge (which should be the straight or "tried edge" of the board) with the steel-square, place one arm on the square parallel with the tried edge and mark along the other arm. To perform the same operation with the try-square, place the handle against the tried edge, as shown in Fig. 20.

Oftentimes it becomes necessary to draw a line parallel to the tried edge. This may be done roughly with the rule and pencil as shown in Fig. 21. Grasp the rule in the left hand, with the first finger touching the tried edge of the board, and hold the pencil point against the end of the rule with the right hand. Keeping this position, with a steady hold on the rule and pencil, move your hands along the board. The result will be a line parallel to the tried edge.

At first you may have trouble in making a straight line, but with practice you will be able to hold the rule and pencil steadily.

For particular work, where it is necessary to get a perfect straight and parallel line,

A marking gauge should be used. This is nothing more than the above principles combined in

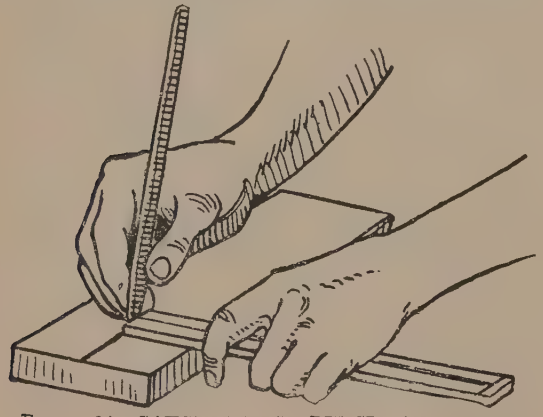
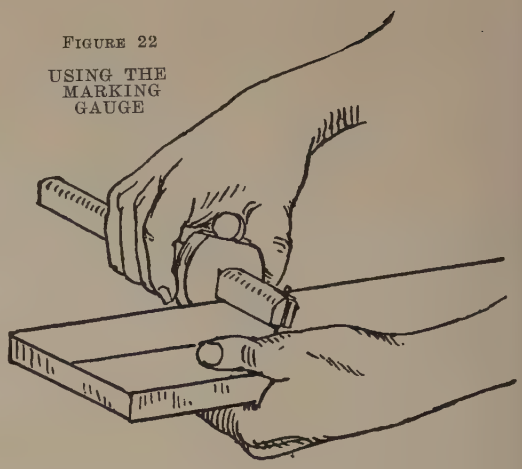


FIGURE 21—GAUGING WITH PENCIL AND RULER

FIGURE 22

USING THE MARKING GAUGE



a tool. It consists of a graduated shaft, or rule, with a small needle or spur in one end, which slides through a mortise made in a block of wood known as the head.

To operate the gauge, set the adjustable head

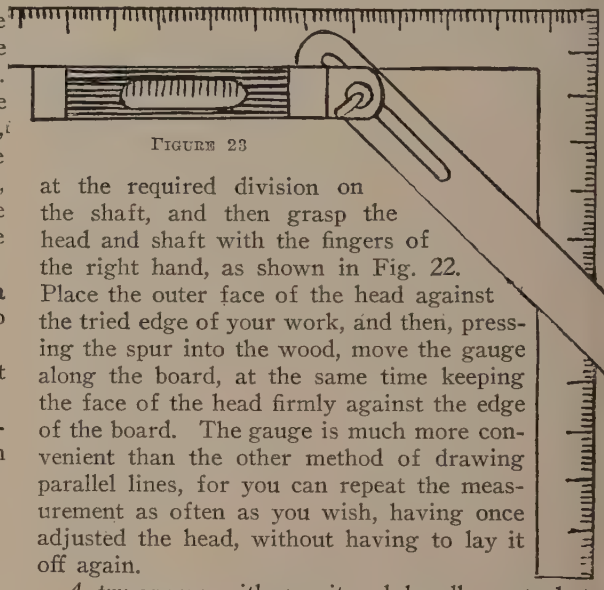


FIGURE 23

at the required division on the shaft, and then grasp the head and shaft with the fingers of the right hand, as shown in Fig. 22. Place the outer face of the head against the tried edge of your work, and then, pressing the spur into the wood, move the gauge along the board, at the same time keeping the face of the head firmly against the edge of the board. The gauge is much more convenient than the other method of drawing parallel lines, for you can repeat the measurement as often as you wish, having once adjusted the head, without having to lay it off again.

A try-square with a mitered handle costs but little more than the ordinary make, and is much handier, inasmuch as it can be employed in making miters, by placing the beveled end against the side of the work instead of the straight side (see Fig 20).

The bevel is in reality a try-square which can be adjusted to any desired angle. To set it at an angle of forty-five degrees, place it on the steel-square, as shown in Fig. 23, with the handle against the inner edge of one arm of the square and the blade resting on both arms. Move the

blade until it strikes equal distances on the arms (this is shown at four inches in the drawing) and tighten the screw while it is in this position. Other angles may be drawn out upon a piece of wood and the bevel adjusted to them so that these angles can be laid off upon other pieces. You will find the bevel handy for reproducing angles. However, if you are supplied with a mitered try-square you can easily dispense with it for ordinary work.

There will be times when you wish *to divide a board* into a number of equal parts, which may be found to be fractions of an inch that cannot be easily laid off with the rule in the ordinary way. It can be accomplished with a pair of compasses, but until you become practiced in their use, it will take some little time in setting them, dividing, resetting, and redividing, until the exact divisor is obtained. A much quicker method is that performed with the rule, as shown in Fig. 24.

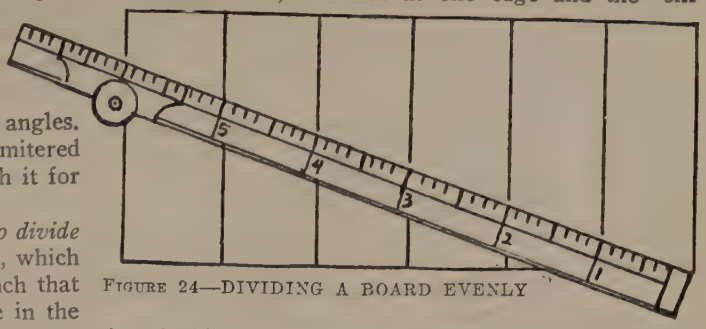


FIGURE 24—DIVIDING A BOARD EVENLY

Suppose you wish to divide a board five and three-quarter inches long into six equal parts. Place your rule across the board, as shown in the illustration, one end at one edge and the "six-inch" division at the opposite edge. Mark off the six divisions and then square the lines across the board at these points with the try-square. This will give you the required six equal parts.

In the same way longer boards may be divided up by using two and three inch divisions on the rule instead of one-inch, and smaller pieces by using half and quarter inch divisions.

HOW TO READ A WORKING DRAWING*

A WORKING drawing of an object consists of one or more views of that object so drawn that they make clear the size and shape of it, and the kind of material of which it is made. With the exception of such lettering as may appear on it, it is a universal language, understood by all nationalities in which mechanics have attained any standing. Once the A B C of mechanical drawing has been learned, there is no difficulty in reading even complicated blue-prints. Fig. 1 gives the alphabet and interprets its different kinds of lines. Fig. 2 shows the working drawing of a common wooden spool, such as thread is wound on. Here one can easily see how the different lines tell their story.

1 ———— 1. Light line—For penciling and cross-hatching.
2 ———— 2. Full line—For visible outlines of objects and limits of parts.
3 ———— 3. Heavy line—For border lines.
4 - - - - - 4. Dot line—For outlines of invisible objects and limits of invisible parts. Same width as 2.
5 —— —— 5. Dash line—For projection lines. Same width as 1.
6 —— — 6. Long dash line—For dimension lines. Same width as 1.
7 —— · —— 7. Dot-and-dash line—For center lines and section lines.

FIGURE 1

The working drawing, when it is complicated, is often assisted by the perspective, which shows the shape and form, although not the size. A good illustration of the difference between a perspective and a working drawing is obtained by standing on a railroad track. The rails seem to meet in the distance. A perspective drawing would so represent them. In fact, however, there are everywhere the same distance apart, and it is in that way that a working drawing would represent them.

The proper relative positions of the various views in the drawing are shown in Fig. 3. The top view is always directly above the front view; and the side views are placed one on each side of the front view. In the drawings for a building these

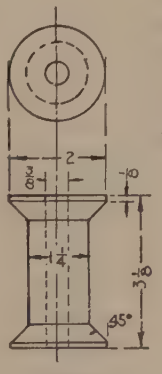


FIGURE 2

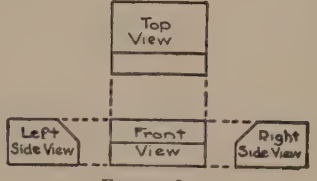


FIGURE 3

*By courtesy of *The Youth's Companion.*

would be called elevations and plan. It will also be observed that the different views are so arranged, with reference to the front view, that that part of the side view which is nearest the

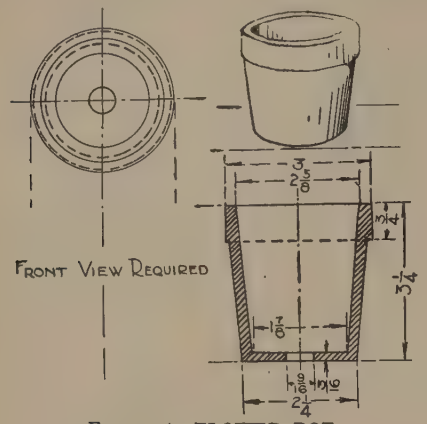


FIGURE 4—FLOWER POT

front view represents a part of the front of the object; and that that part of the top view nearest the front view also represents a part of the front of the object. It will be seen, too, that the horizontal measurements of like parts of the front and top view are alike, and that the vertical measurements of like parts of the front and the side views are alike.

When the views alone do not give all the information desired, views of the interior, called cross-sections, are made, as appears in Fig. 4. That these sectional views may be known as such, they are cross-hatched with slanting lines; and lettering usually indicates what section the view represents. Of course the object is not really cut; the section merely shows what its appearance would be if it were cut on the line indicated.

Since it would be impossible to make all working drawings of full size, a scale is necessary. Various ratios are used, such as one-fourth inch on the paper to one foot in the object, or one-half inch on paper to one foot in the object; but no matter what scale is used, the numbers on the drawing represent the size of the object, and not the size of the drawing. Knowing the scale, it is possible, by measuring the drawing and applying the scale, to tell the size of any part of the object, even though no dimensions in figures be given.

Sometimes the object to be represented is made up of parts so different in size that it is difficult to find a single scale suitable for all of them. In this case a scale is used that brings the small parts up to a convenient size, and the larger parts are represented by a broken view, as in Fig. 5.

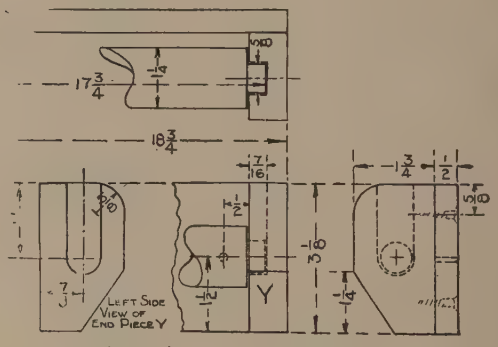


FIGURE 5—TOWEL ROLLER

Here, of course, dimension figures were necessary to make this size plain, for the size of a part shown only in broken view cannot be secured by measurement; and should the figures be omitted, there would be no way to learn the dimensions.

WORK-BENCH

BY F. P. REAGLE

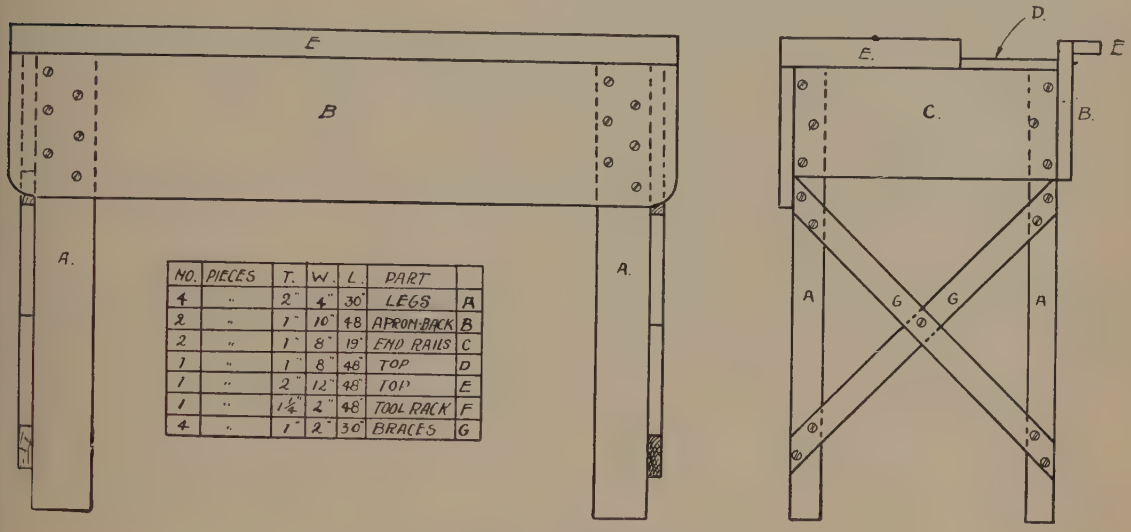
EVERYONE who likes to make things, or who likes to work with tools or machines, should have a strong, firm work-bench on which to place hammer and saw, and well equipped with a good vise, tool-rack and other appliances for assembling work or storing tools and materials. Such a work-bench can be made by any handy boy at a very small cost and with few tools.

Fig. 8 shows this bench in a working drawing. The heavy working top of the bench is made of a piece of 2 by 12-inch planed hard pine, 48 inches long. The back part of the top is constructed of thinner wood ⅞-inch thick, so that a convenient tray is thus formed to hold a few nails, screws, or tools which the worker must have around during his endeavors. The legs of the bench are made of 2 by 4-inch planed hard pine, cut to the proper length to suit the worker. For the average boy this would be about 30 inches.

The pieces fastened to the legs around the top are called rails. These rails should be made of ⅞-inch by 8-inch for the front ends and ⅞-inch

by 10-inch for the back. The operation of putting a piece of work together is called assembling. In assembling this work-bench it is well to complete the ends first. This should be done by placing the legs on the floor and fastening the end rails to them, using thin brads in the upper edge which was 10 inches wide, should be made even with the bottom edge of the end rails, which will mean that it will extend 2 inches above the legs at the back. The reason for this will be apparent when the bench is completed.

We are now ready to complete the table by



NO.	PIECES	T.	W.	L.	PART	
4	"	2"	4"	30"	LEGS	A
2	"	1"	10"	48	APRON-BACK	B
2	"	1"	8"	19"	END RAILS	C
1	"	1"	8"	48"	TOP	D
1	"	2"	12"	48"	TOP	E
1	"	1¼"	2"	48"	TOOL RACK	F
4	"	1"	2"	30"	BRACES	G

FIGURE 8—WORK BENCH

only. After "squaring" up the legs with the lower edge of the rail, these parts can be fastened permanently, either with 8-penny nails or with screws.

The diagonal braces, also shown in Fig. 8, should be fastened before going any further with the assembling. These are made of planed 1 by 2-inch pine. These pieces will have to be joined together at the middle with a "half lap" joint and fastened to the legs with 2-inch screws or nails. Screws are always more satisfactory in assembling a piece of work made of wood.

The boy worker will notice that thus far some words have been used which he may not understand. I hope that words, such as "square up," "half lap joint," and many others will be interesting enough to the youthful contractor to cause him to look them up in the dictionary or the encyclopedia.

After the ends are assembled complete, we are ready to fasten the front and back rails. These rails should be cut 48 inches long, same as the top, and the bottom corners either rounded off or sawed off, as shown in the drawing. The front rail should be fastened even with the end rails, both at top and bottom. The back rail, attaching the top. For the thick, heavy part of this top, the boy contractor should purchase at any hardware store six 2-inch angle braces. These are usually made of iron ⅛ inch thick, ½ inch wide and bent L-shaped, and have holes for screws drilled in them, two on each leg of the angle. These braces should be fastened first to the inside of the end rails and front rail, two on each end, and two to the front. In placing the braces, drop them about ⅛ inch below the top edge of the rails. Now turn the bench upside down on the 2-inch top, even up in front and at the ends, and drive the screws home into the top. The back part of top or tray can now be attached, using 2-inch screws, driving them down into the end rails. The bench is now complete with the exception of a tool-rack and vise.

The tool-rack can be made of a piece of 1 by 2-inch or 1⅛ by 2-inch planed pine. After cutting holes in this piece to hold all the tools needed most often, this piece should be screwed fast to the back rail, even with the top.

A good vise is very essential if the worker is to be happy and successful in his efforts. If it can be afforded, a good, rapid-acting iron vise is the most satisfactory tool. There are many of

these on the market, and one may be bought for a few dollars. The boy worker is advised to inquire of the hardware stores in his neighborhood, or ask advice from his carpenter friend before any purchases are made.

A very satisfactory vise can be made by a clever or handy boy, using an iron screw and nut, such as can be purchased in many hardware stores. The other parts of this kind of vise are made of wood. A piece of hard wood—maple or oak—2 by 8 inches and 28 inches long, will about complete it.

All new woodwork, such as the work-bench and tool-cabinet, should be protected against dirt and dust. This can be satisfactorily done by first applying a liberal coat of linseed oil. After this is thoroughly dry a coat of shellac or varnish will make a lasting and pleasing finish. A good coat of battleship-gray paint will be a substitute for the treatment mentioned above, and will also render the bench moisture-proof and dirt-proof. Do not apply any finish to the working top of the work-bench, as bare, smooth wood makes the most desirable working surface.

In addition to the work-bench, with its rack to accommodate tools, the worker will find that a tool-chest of the wall-cabinet variety will be a most convenient help in storing out of the dust and dampness the many tools and supplies not needed quite so frequently as those placed in the tool-rack but which should be convenient of access at any time. Such a cabinet should be hung on the wall over the back of the work-bench or somewhere near, so that it can be reached without taking more than a step or two.

This cabinet, which can be made of an old packing-case, will hold all the things which the worker wants under lock and key when not in his laboratory. A convenient size is 12 inches deep, 22 inches wide, and 30 inches long. If made with two or three drawers, about 3 inches deep in the bottom part of the cabinet, it will accommodate a good stock of nails, screws, and brads. A good arrangement is to partition off one or both of the drawers into small compartments, say 2 or 3 inches each way. The inside of the door and also the back and sides of such a cabinet, when hung on the wall, will afford hanging space for many tools. Each tool should have its own nails, or nails to hang from or to lay on. To arrange things this way will take a little time, but the worker will save time later by not being compelled to search for the tool wanted.

An assembly table may consist of any discarded table or boards on horses, or large packing-case, and will be convenient in putting together many of the coming problems. This method of work will allow the top of the work-bench to be free for tool operations, such as planing, boring, and so on.

By this time the boy worker is no doubt wondering where the materials mentioned thus far can be procured and what they will cost. The wood mentioned in the description of the work-bench is what is known as "stock" lumber, and should be secured at any lumber yard which deals in building materials.

The tool-chest, if made of a selected packing-case, need cost the boy nothing but a little effort in soliciting the box. If of ⅞-inch planed pine shelving 12 inches wide, it can be made at small cost.

A keen, live boy who is looking for business should be able to secure enough repairing and work around his neighborhood to earn all the money for his material in a short time. Your neighbors are always looking for someone to put up shelves, take down and put up screen-doors or window-screens, or to do a little painting here or there. Again, some of the objects described later may be sold for Christmas presents for children, and thus net the ambitious boy an income for further addition to his own kit of tools.

The following list of tools can be procured at any reliable hardware store. It is economical in the long run to buy only the best tools that are on the market, as poor steel is expensive at any price.

One 22-inch cross-cut saw, 10 point.
One 6-inch try-square.
One 7-oz. adze eye hammer.
One 1-inch Buck Bros. firmer chisel.
One ½-inch Buck Bros. firmer chisel.
One ¼-inch Buck Bros. firmer chisel.
One No. 120 Stanley block plane.
One 605 Bailey jack plane.
One marking gauge.
One screwdriver.
One 8-inch swing brace.
One auger-bit (Russell Jennings), each of following sizes: ¼-inch, ⅜-inch, ½-inch, ¾-inch, ⅞-inch, 1-inch.
One gimlet bit, each of following sizes: 4-32-inch, 5-32-inch, 6-32-inch, 7-32-inch.
One rose countersink.
One screwdriver bit.
One combination oil stone.

This list of tools is ample for the young student to begin his work, and will not be so expen-

sive as one would naturally think. As wants increase it is advised that these additions be made:

One 12-inch turning saw.
One 18 by 24-inch carpenter's steel square.
One 24-inch rip saw, 6 point.
One spoke-shave, No. 54.
One brad-awl.
One side-cutting pliers.
One pair winged dividers.
One Yankee hand-drill, with set of bits.
One set iron drills, Nos. 1 to 60.
One miter-box.

When buying tools from a local hardware man, or if they are sent for away from home, always ask for any catalogues or advertising material available. The manufacturing companies are constantly issuing booklets which are as good as textbooks, and which they are anxious for you to have.

ANIMAL TOYS

BY HARRIS W. MOORE

These animals (Plates 1, 2 and 3) should be sawed from thin wood. Cigar boxes can be used for these and other toys, if the boxes are soaked in cold water until the paper can be scraped off easily, and then dried thoroughly for a day or more. To prevent the boards from warping, the boxes should be placed in stacks and tied firmly together with strong string. After the boxes are thoroughly dried—and remember that the moisture on the inside must escape through the wood—pry them apart with a strong, dull, thin knife, like a putty-knife, and pull out the nails with the claw of the hammer so as to be able to use them again. Cigar boxes are usually made of a kind of mahogany which splits easily, therefore work carefully so as not to split the wide boards. Because wood splits with the grain, boys must learn to respect this law regarding wood. It will require thought and experience to learn to avoid splitting.

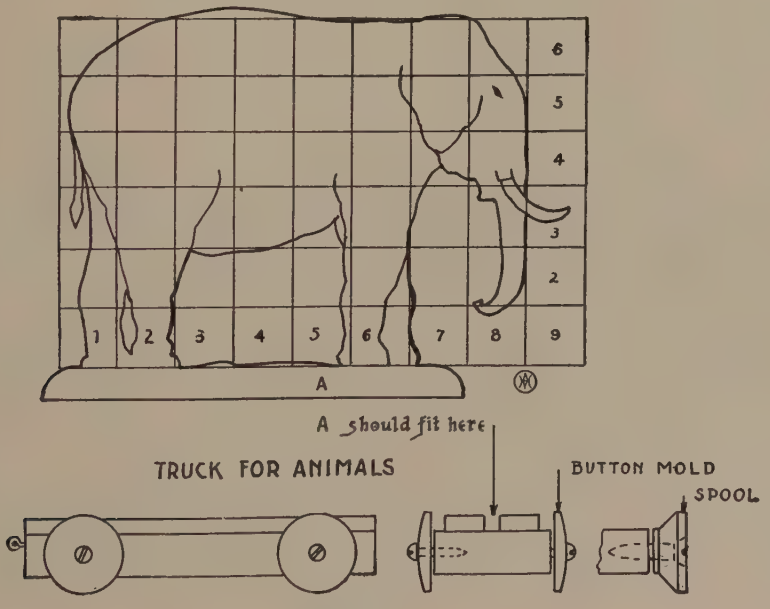
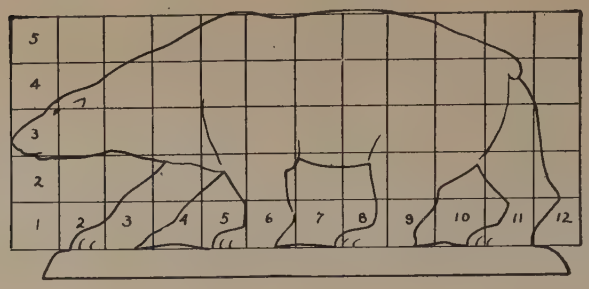
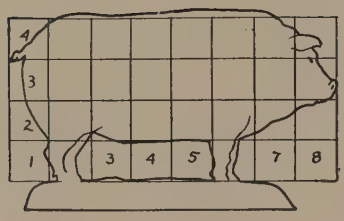
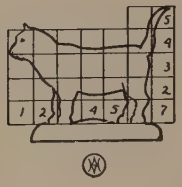


PLATE 1

Because the legs of the animals are, in general, the weakest parts, the grain should run up and down. If three-ply veneer, that is, three thicknesses of wood with the grain at right-an-







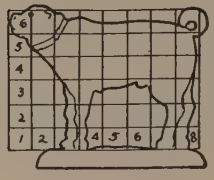
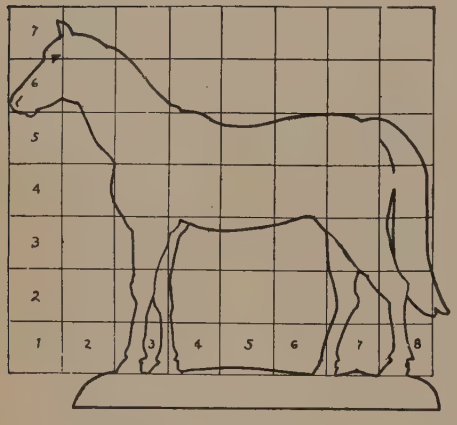
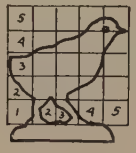
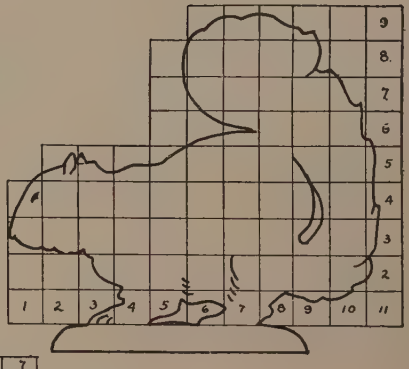
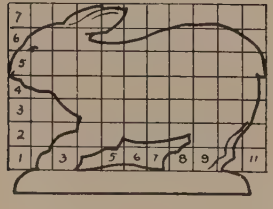


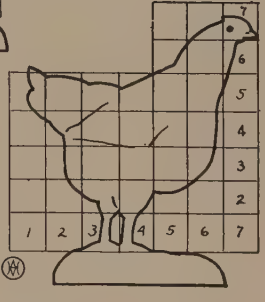
PLATE 2











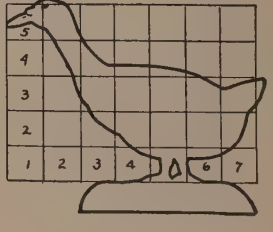
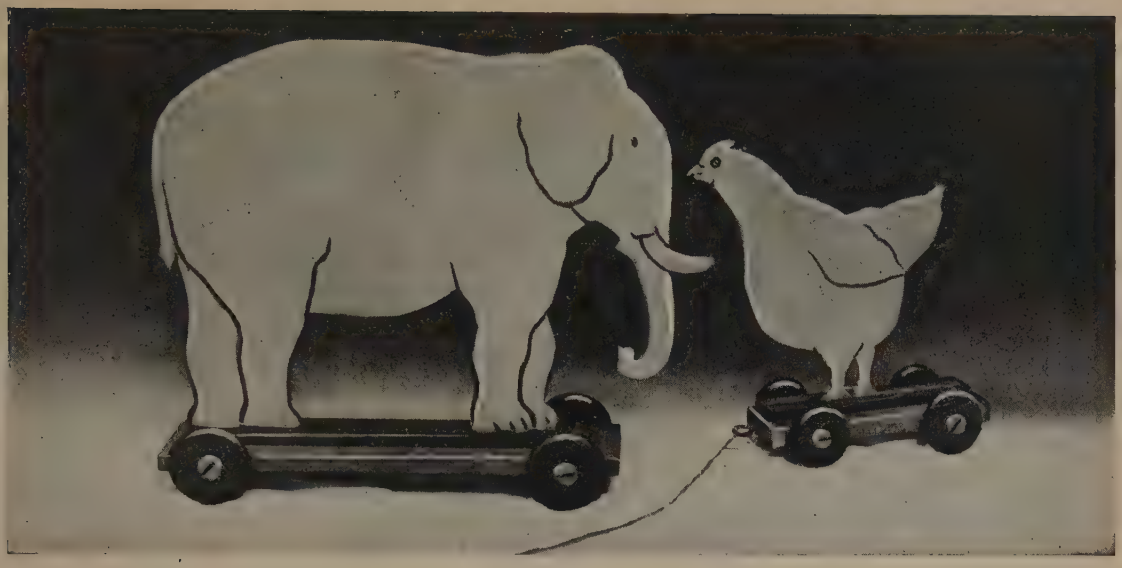


PLATE 3

gles, glued together, is used, the animals can be sawed without minding which way the grain goes.

To draw an animal, first decide how big it is to be, then draw on the board as many squares as are in the picture. After these squares are drawn with a try-square, lightly sketch the outline, square by square, then go over the light sketch with a stronger line, thinking not so much of the separate squares as the general shape of the animal.



THE ELEPHANT AND THE CHICKEN

If a foot-power scroll-saw is used for the sawing of these animals, the work must be held firmly on the saw-table and the saw should go rapidly when turning a corner. To saw into sharp corners, it is better to saw into the corner twice, once along each line making the corner. This method will lend crispness to the shape. If a bracket saw is used, first make a saw-table as suggested in Fig. 9. Try to keep the saw blade straight up and down. After the animal is sawed out, the edges should be smoothed and rounded with sandpaper.

To finish the animals, they should be painted with appropriate colors. Study picture books to

HORSE, GOOSE, CHICK, SQUIRREL AND RABBIT

get ideas. Water-colors, oil paints, or cold-water paints may be used. A little cold glue should be mixed with the cold-water paints. With a few colors. Paste brushes sometimes answer the purpose, or larger brushes can be trimmed smaller with scissors. To do a good job of painting, one

THE PIG, THE BEAR, THE DOG, AND THE CAT

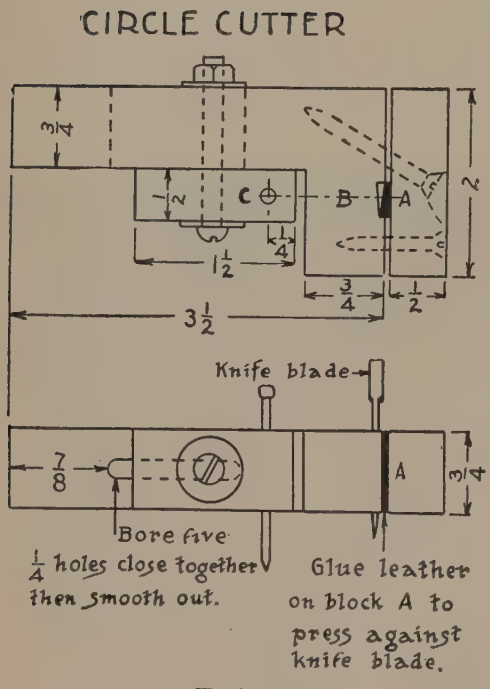


FIG. 12

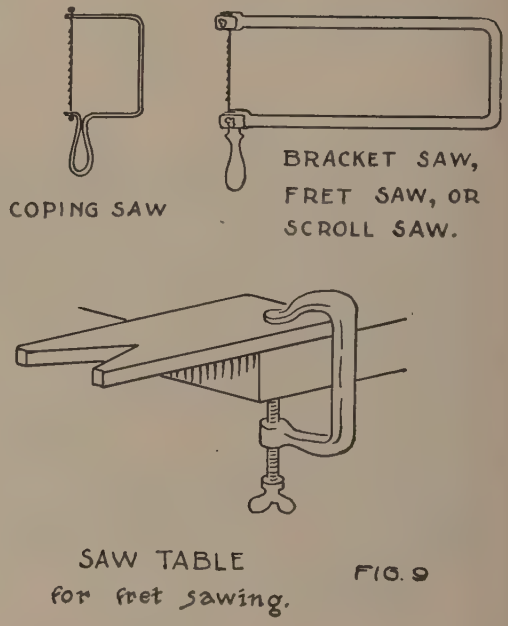


FIG. 9

bright colors, red, yellow, blue, green, white and black, many other colors can be made by mixing in teacups or other small vessels. For oil paints, the brushes should be stiffer than for water- must be willing to let each coat of paint dry before applying another. It is a fine habit to plan work enough ahead so that paint and glue can dry properly while one's interest and attention

are turned to a second or even a third task. Paint brushes should be cleaned in turpentine or kerosene, followed by soap and hot water.

Trucks for animals should be made to fit the animal. Wheels can be made in several ways, as for instance, brads, button molds, spools, or dowels. Usually they had better be painted while separated from the truck, and of a different color.

If a whole menagerie is wanted, trace other animals from pictures and enlarge them by this method of squares.

JUMPING-JACK

The jumping-jack (Plate 4) is made of eight pieces of thin wood loosely joined with wire or cotter pins (see blacksmith, Plate 5). Put

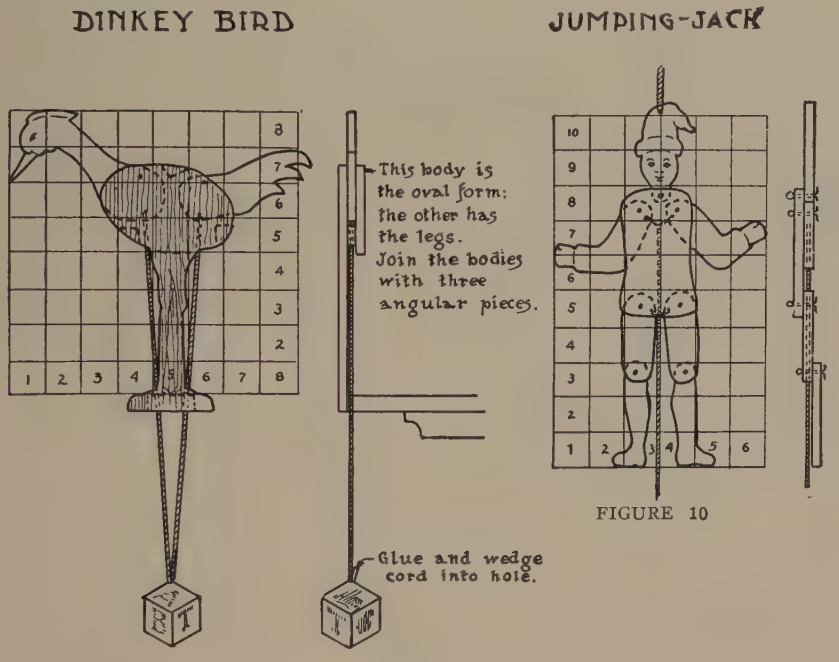

DINKEY BIRD
JUMPING-JACK
This body is the oval form; the other has the legs. Join the bodies with three angular pieces.
Glue and wedge cord into hole.

FIG. 13 PLATE 4 FIGURE 10

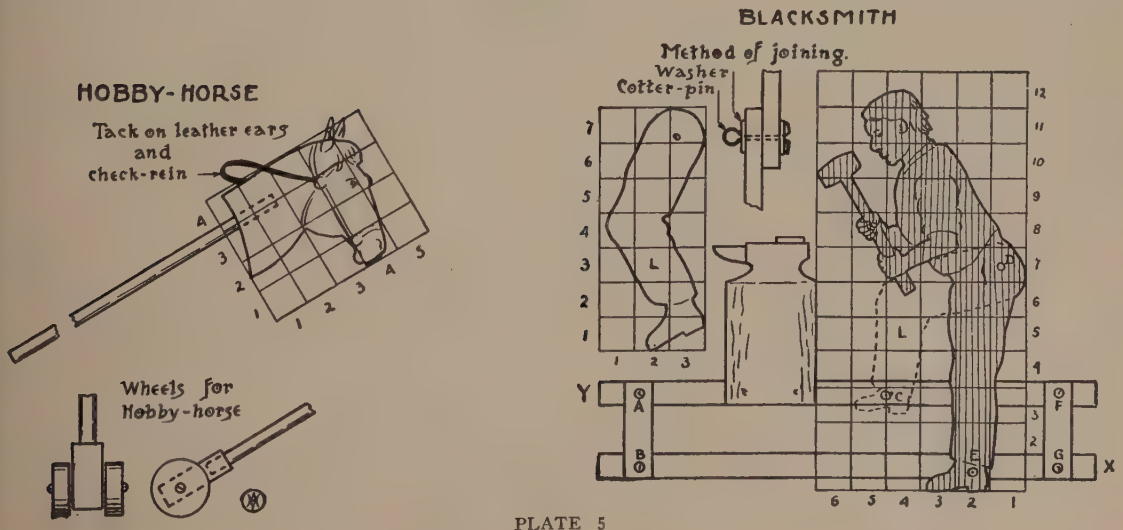


PLATE 5

strings through holes near the inner sides of the arms and legs, and to these two strings tie a longer string to reach below the feet. Jack is made to jump by pulling this string and one tied in his cap.

BLACKSMITH

The shaded part of Plate 5 is one piece. The upper leg is looseiy fastened at C and D, as shown in the method of joining. This same method is used at A, B, E, F and G. If the squares are ¾-inch, the blacksmith will be about 9 inches tall; the long bars, 14¼ by ⅜ inch; and the short vertical bars 2¾ by ⅜ inch. After these parts are fastened together, nail the anvil and block to the upper bar in such a position that the blacksmith's hammer will strike what represents the iron on top of the anvil. By grasping the long bars at X and Y, the blacksmith can be made to hammer his iron in a lively fashion.

DINKEY-BIRD

The dinkey-bird (Fig. 10) should be cut out and assembled as shown in the drawing. Make one head and tail, and two pieces like the body, and two legs. Assemble by nailing the two parts of the body firmly to the legs. The joints at A and B should be extremely loose, and the space between the two parts of the body be such that the head and tail will work freely. This can be accomplished by nailing a small piece of wood slightly thicker than the head and tail parts between the two body parts. Such a piece is indicated by dotted lines at D. After attaching the strings as shown and assembling the bird, it is attached to a small piece of wood the end of which shows at E. This piece is long enough to be fastened to the edge of a table, using either a clamp or a weight. Now by swinging the lead weight like a pendulum our prehistoric bird ducks his head and tail alternately, owing to the fact that the weight of the lead is transferred from one branch to the other of the forked strings running to the head and tail. It may be advisable to run these two strings through holes in the base rather than to have them separated as widely as shown in the drawing. The length of the string from the fork down and the position of attaching it will offer some chance of experimentation in getting the best results. Our ingenious boy can easily make a donkey, duck, or parrot patterned after this bird. Plate 4 shows another dinkey-bird which has a somewhat different movement of head and tail.

THE BALANCING HORSE

The balancing horse (Fig. 11), if properly made, seems to defy the laws of nature. After you succeed in making him work well, ask some of your scientific friends to explain the principles underlying his action. To make this natural freak, first cut from some thin piece of wood the model of the size desired. Remember that an easy way of enlarging these drawings has been given under the description of the first

FIG. 10

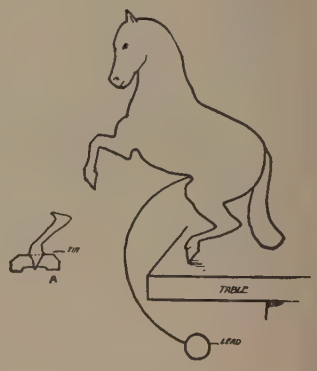


FIGURE 11

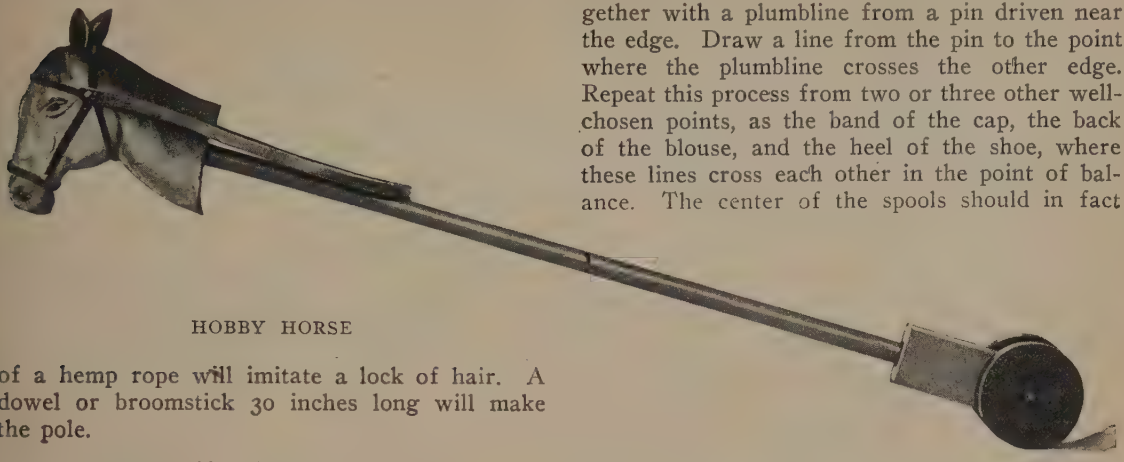
toys. The stiff wire which is attached to the body of the animal should have sufficient bend in it to clear the edge of the table or shelf on which he operates, and should terminate in a lead weight heavy enough to obtain the result desired. This weight can be cast by pouring some hot lead in a hole bored in a piece of wood. By holding the end of the bent wire in the hole while pouring, the weight can be cast fast to it. Free the lead from the wood by splitting the wood away.

The operator may have trouble in making his horse stay on the table while doing his prancing stunt. To avoid this, cut a piece of tin and fasten it in a fine saw-cut in the back leg.

HOBBY-HORSE

The hobby-horse (Plate 5) will make a good gift to some smaller brother or friend. Boys sometimes find that toys they are able to make have been outgrown by themselves, but this gives them a good chance to play Santa Claus to some other boy. The head should be drawn on 1½ inch squares on a board 7½ by 6¾ inches. Such a thick board should be cut with a turning saw, or it may be sawed out approximately with an ordinary cross-cut saw, if many cuts are made, and then smoothed with spoke-

shave, knife, rasp, and sandpaper. To make the ears quite like real ears, the leather should be folded when it is tacked on. The frayed end



HOBBY HORSE

of a hemp rope will imitate a lock of hair. A dowel or broomstick 30 inches long will make the pole.

PARROTS AND CLOWN

Like the balancing horse, the parrots (Plate 6), can be made to balance on a shelf, table, or other perch by lead or other weights on the tip of the tail. They should be painted with bright colors.

The tumbling clown (Plate 6) should be sawed from wood about 5/16 inch thick. Heavy cardboard can be used. To find the point of balance (the center of gravity, a scientist would call it) suspend the clown, after it is sawed out, together with a plumbline from a pin driven near the edge. Draw a line from the pin to the point where the plumbline crosses the other edge. Repeat this process from two or three other well-chosen points, as the band of the cap, the back of the blouse, and the heel of the shoe, where these lines cross each other in the point of balance. The center of the spools should in fact be placed the least bit above this point (say 1/16 inch) so that when at rest the clown will sit upright. A skewer makes a good dowel. In the hole in the spool a peg must be glued, and a new hole bored to fit the skewer. Straight bars may be used for the clown to tumble on, but curved ones like a roller-coaster make him more interesting, for sometimes he cannot get over

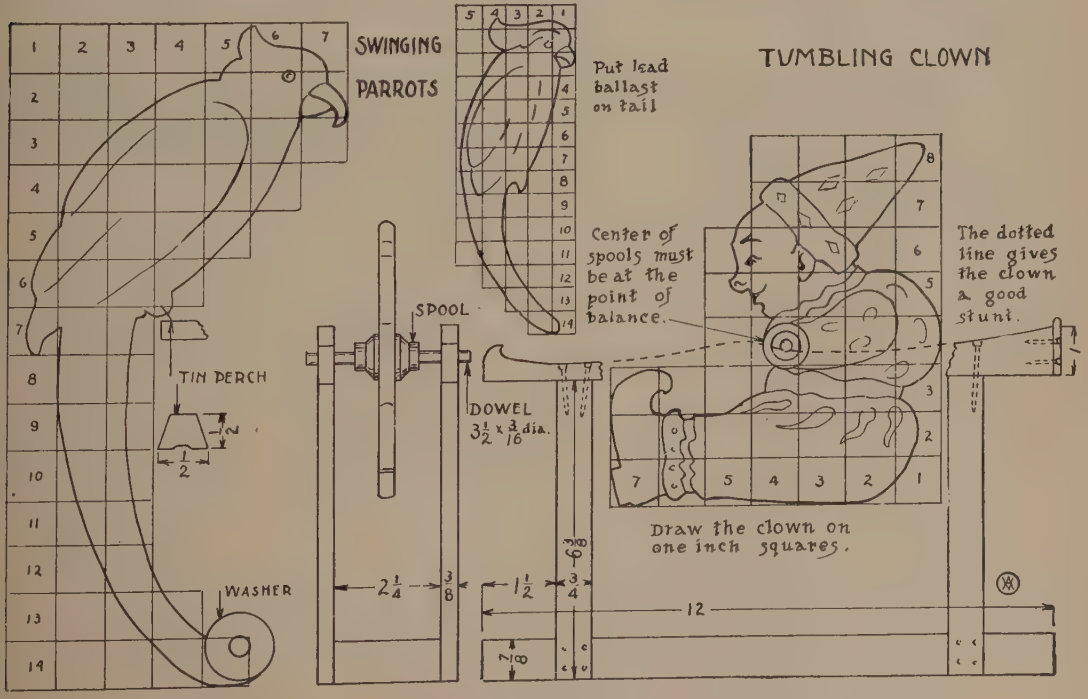


PLATE 6

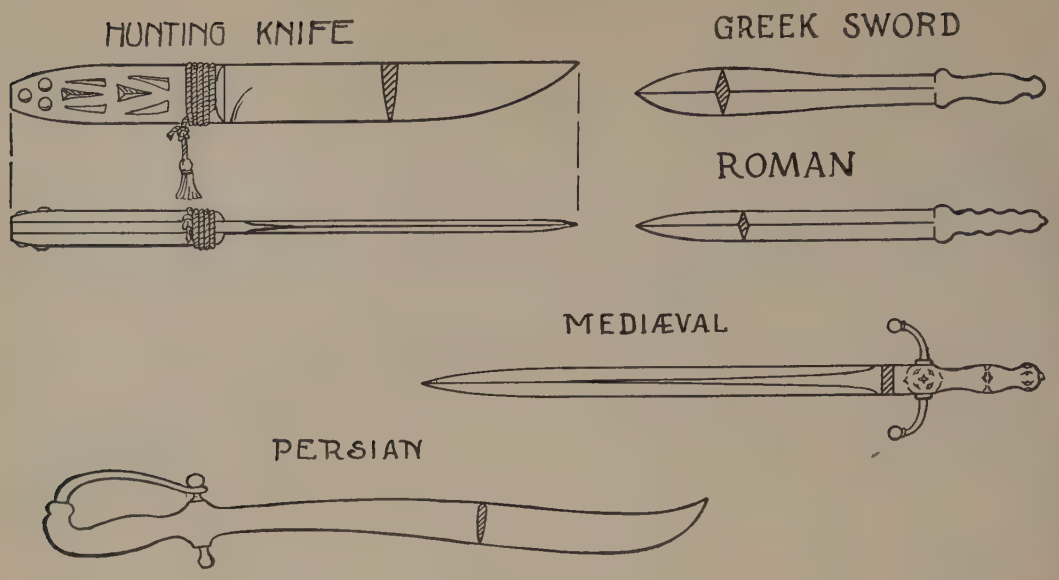


PLATE 7

the top, and will then roll backward. Curved bars should be fastened together while sawing or shaping them. A small block is nailed to the wide end of each bar to prevent the clown from rolling off. The face may be painted white, and the suit bright colors.

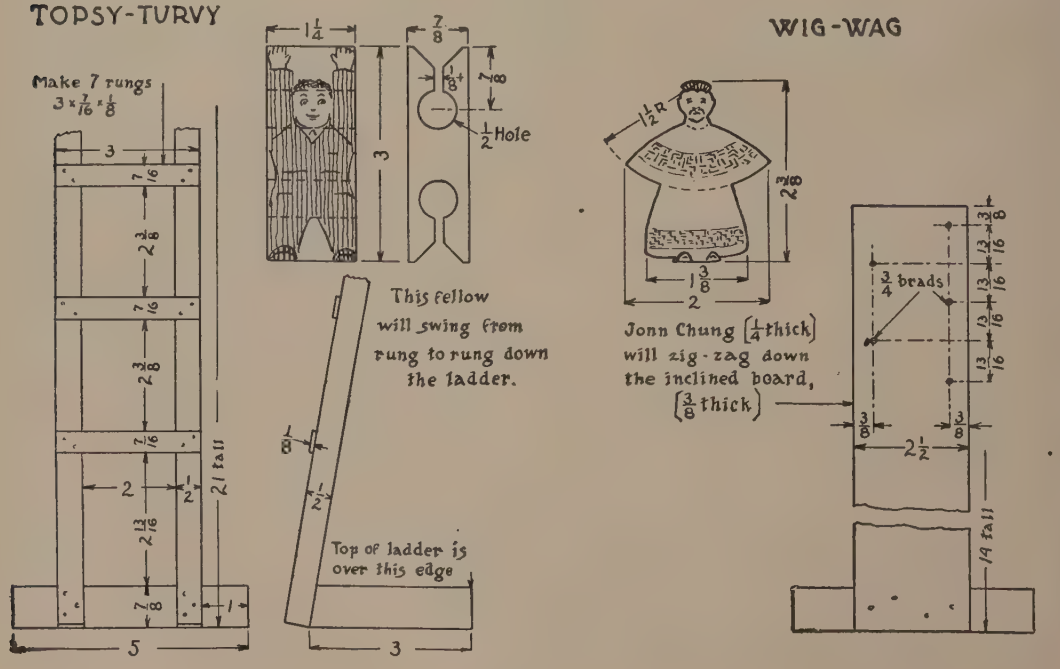


PLATE 8

SWORDS AND HUNTING KNIFE

The hunting knife (Plate 7) may well be made 9 by 1⅛ by 3/16 inch with two pieces 4 by 1⅛ by 3/16 inch glued to the handle. Shape the blade, and sharpen it with spoke-shave, file and sandpaper. Shape the handle pieces, and sandpaper the curved end nearest the blade before gluing. After the glue has dried six hours, or over night, round the handle somewhat before carving it

MERRY-GO-ROUND

and nailing it with brass tacks. The carving can be done with a knife, chisel or skew-chisel. A skew-chisel is a carving-chisel which, instead of being ground square across the end like an ordinary chisel, is ground slanting about sixty degrees to the longer edge of the chisel—"on the bias," as mother would say if dressmaking. The shaded portion (sections) in the blades shows how the various blades are to be sharpened.

A case for the knife and a scabbard for the swords may be made of enamel cloth or imitation leather.

Greek swords (Plate 7) should be about 16 by 2 by ½ inch; the Roman sword, 16 by 1½ by ½ inch; the Mediæval, 26 by 1¼ by ½ inch; and the Persian, 28 by 2½ by ½ inch. The curved guards on the Mediæval and the Persian swords can be made of lead, solder, or copper wire—some soft metal such as a boy can bend, hammer and file. If a boy wants to gild any of these swords with gold or silver paint, he will have a veritable shining sword, or he may spread some liquid glue on the wood and then cover it with tinfoil.

TOPSY-TURVY

This toy (Plate 8) requires considerable accuracy in its construction, especially in the following parts: The sides of the ladder must be exactly upright as seen from the front; the rungs must be square with the sides of the ladder and evenly spaced; the holes through the block must be square with the sides and their centers exactly ⅞ inch from the ends of the block. Perhaps father will bore these holes and plane a strip 22 by 7/16 by ⅛ inch out of which the rungs are made. A strip of wood can be planed thin if it is pegged to a flat board with wooden pegs. One way to get the slant of the front of the base is to set the ladder on the floor 3 inches from the wall and lean the top against the wall; then rest the base to this slant and test it again on the floor.

WIG-WAG

This toy (Plate 8) requires smooth edges on the figure and accurate location of the brads on the inclined board. It works better if the feet are cut off, and a piece of lead for ballast is tacked on instead. The board inclines practically the same as the ladder in Topsy-Turvy.

MERRY-GO-ROUND STOCK

Two boards 8 by 4 by 3/16 inch (cigar box).
Two boards 4¼ by 1½ by 3/16 inch (cigar box).
One block, 4 by 1⅝ by ½ inch.
Two blocks, 1 by 1⅝ by ½ inch.
Three arms, 10 by ¾ by ⅛ inch.
One dowel, 11 inches long, to fit in spool hole.
Two spools, 1½ inch long.
Six dowels, or wires, 6½ inches long.
Six animals and riders, about 2¼ by 2¼ by 3/16 inch.

Here is a toy (Plate 9) for a boy to set up in a toy circus and make it go by a crank and string belt, or by an electric toy motor belted to a larger wheel than the spool in the center. The dowel should be made first to fit tightly the central spool

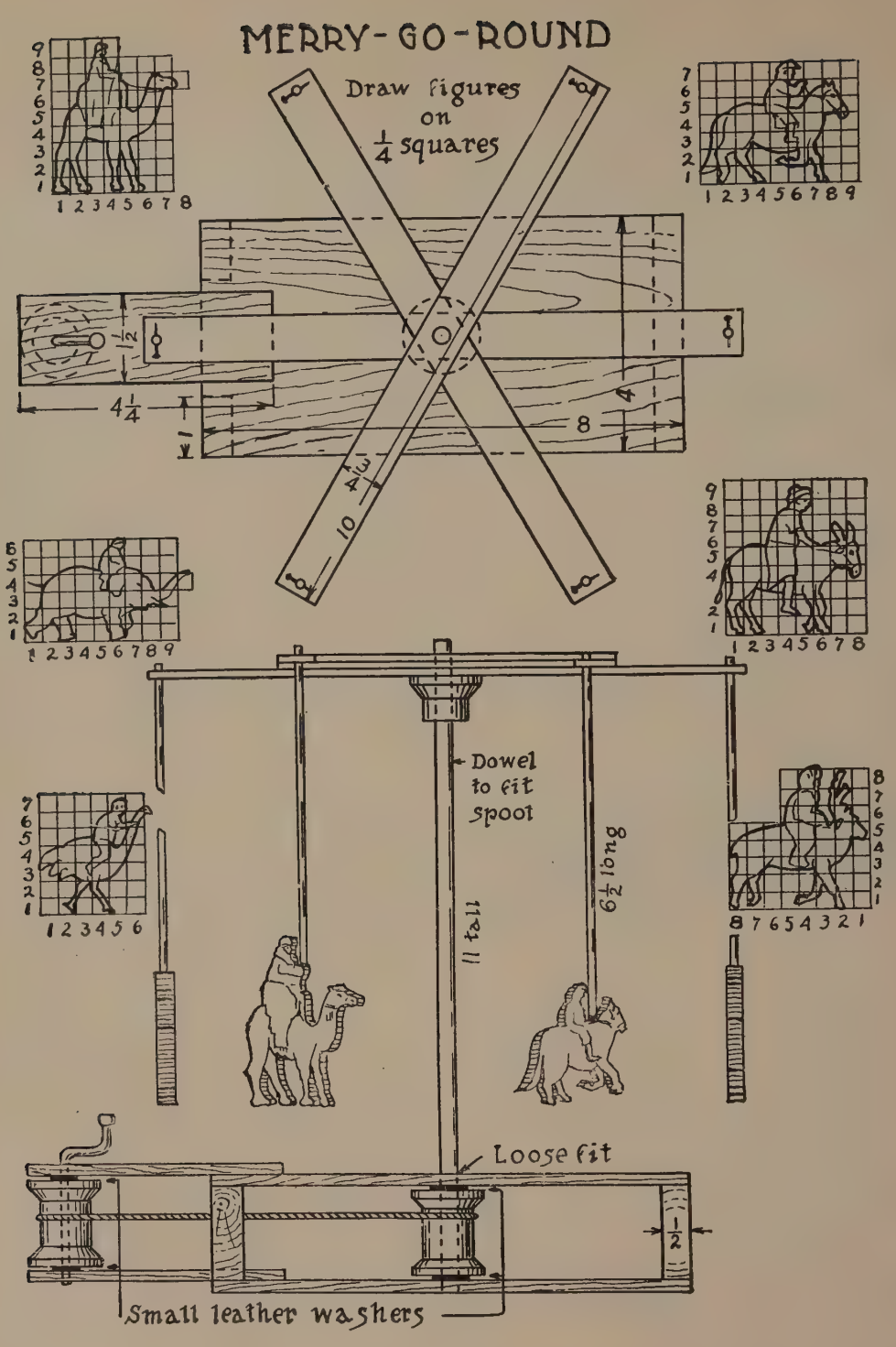

MERRY-GO-ROUND
Draw figures on ¼ squares
1 2 3 4 5 6 7 8
1 2 3 4 5 6 7 8 9
1 2 3 4 5 6 7 8 9
1 2 3 4 5 6 7 8
1 2 3 4 5 6 7 8 9
1 2 3 4 5 6
8 7 6 5 4 3 2 1
1½
4¼
8
4
¾
10
Dowel to fit spoot
11 tall
6½ long
Loose fit
½
Small leather washers

PLATE 9

and the upper half spool. The dowel should fit loosely in holes in the center of each large board. To glue the arms so that they are equally spaced, draw a 10-inch circle on paper, then with the compass still set 5 inches lay off 6 points in the circle. Did you know that the radius of a circle will lay off exactly 6 points in its circumference? Put glue on the middle of these three arms, and lay them over the circle so that the middle of the ends come over the 6 points in the circle. Place

A hole can be drilled in the top of each animal and the dowel or wire fitted into it tightly. The animals and riders should be painted in bright colors. A string tied tightly around the two spools will carry power to turn the merry-go-round.

RUNNING WHEELS

What a wonderful invention is a wheel! It has an almost infinite number of uses in our pres-

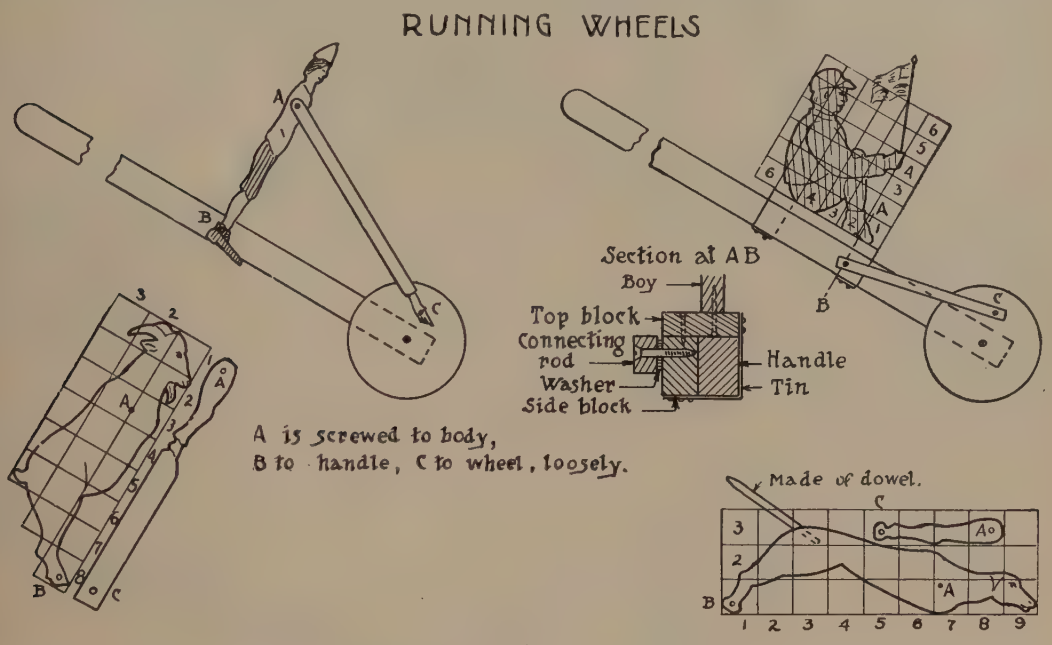


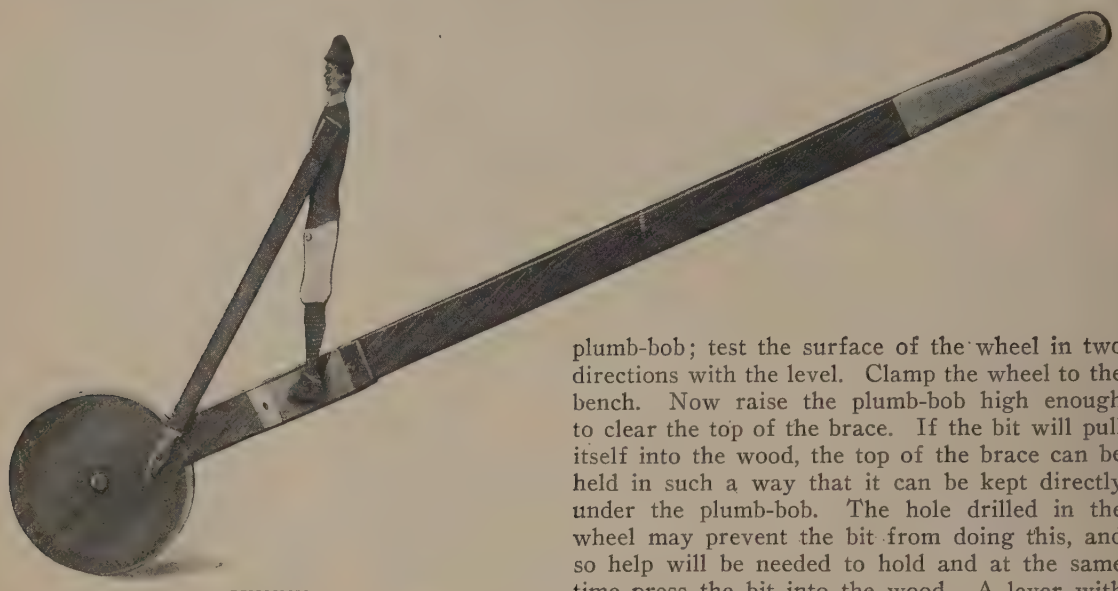
PLATE 10

a weight on the arms till the glue is dry. To make the driving crank, glue a peg in the spool, and carefully drill a small hole straight through its center. A drill made of a knitting needle and 4 inches long is a good one for this job. The crank is bent with pliers or in an iron vise from a 3 inch finish nail, or from a piece of wire. To assemble this part of the merry-go-round, put the crank first through the upper small board, then through a small leather washer, then drive it through the spool, the lower washer, and the lower small board.

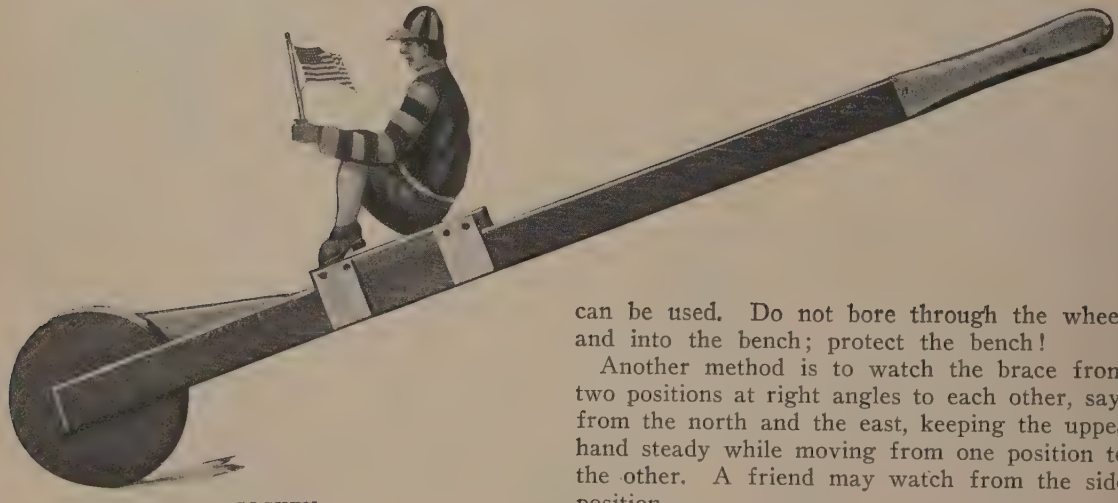
To assemble the other parts, proceed as follows: Nail the lower big board to the three blocks; nail the lower small board to this big board; set the central spool with its dowel and washers upright; place the upper big board over the dowel, and nail to blocks; nail upper small board in place. The remaining parts are easily placed.

ent civilization. When it was invented nobody knows. Somewhere in Asia it was used as a cart-wheel; in ancient Egypt it was possibly used as a pulley. If a boy can make good on wheels, he will find many uses for them. The two great difficulties in making them with bench tools are, first, to make them round enough, and second, to bore a hole in the center square with the surface of the wheels. To help make them round use a circle cutter in a brace, or make one of hard wood as shown in Fig. 12. If a small hole for the nail which centers this circle cutter is drilled in the center of the wheel to be made, and if the knife-blade is out about 3/16 inch, the cutter can be led round and round, and thus a deep cut can be made. If this is done on each side of 1/8-inch wood, the circle is soon cut through; if the thicker wood is used, these deeply cut circles help greatly in sawing and paring the wheel round. A wheel glued up of

thin wood from cigar boxes or orange crates, with the grain at right angles, is strong and durable, if the gluing is well done. A nail should be put through the centers as the parts are glued together. At least four clamps or handscrews should be used to squeeze the parts together.



SKINNY



JOCKEY

There is no convenient, sure method of boring a hole square with the surface of the wheel with a bit and brace, but the following suggestions may help. For the first method a spirit-level and a plumb-bob are necessary. Put a screw-eye in the ceiling over the bench so that the plumb-bob can be raised and lowered over a point, say, 6 inches from the right-hand corner of the bench. Place the center of the wheel exactly under the plumb-bob; test the surface of the wheel in two directions with the level. Clamp the wheel to the bench. Now raise the plumb-bob high enough to clear the top of the brace. If the bit will pull itself into the wood, the top of the brace can be held in such a way that it can be kept directly under the plumb-bob. The hole drilled in the wheel may prevent the bit from doing this, and so help will be needed to hold and at the same time press the bit into the wood. A lever with a hole in it nearly the size of the top of the brace can be used. Do not bore through the wheel and into the bench; protect the bench!

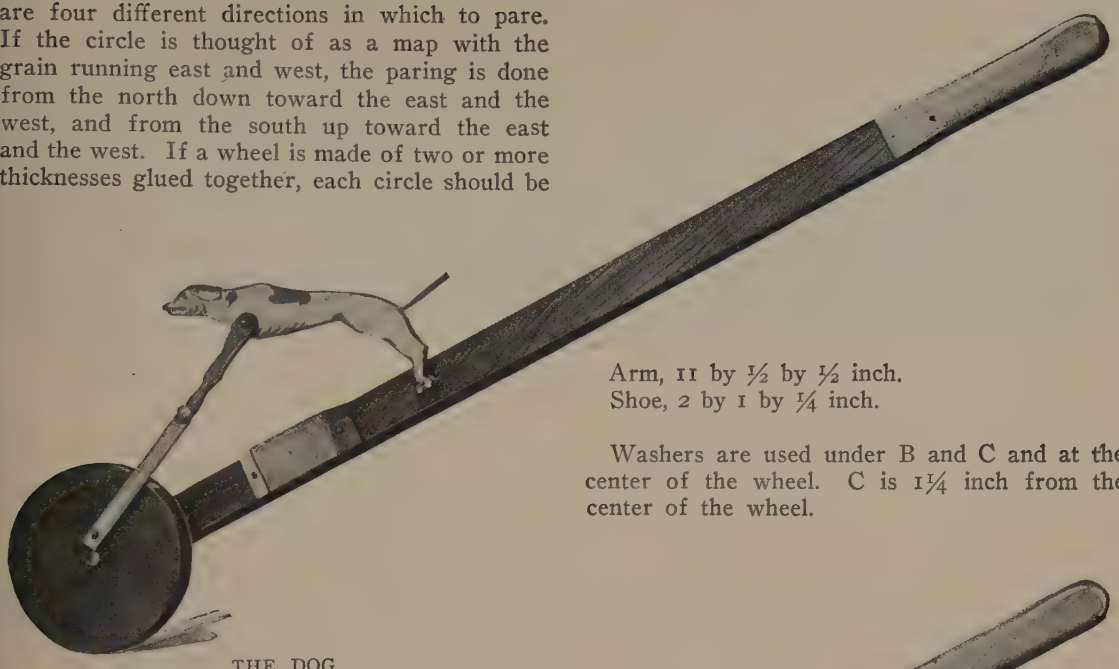
Another method is to watch the brace from two positions at right angles to each other, say, from the north and the east, keeping the upper hand steady while moving from one position to the other. A friend may watch from the side position.

Still another method is to set up one or two try-squares near the bit for guides.

This boring the hole true in the center is a difficult operation, however it is done, and a wheel that runs true may be regarded as a good achievement.

In paring a wheel with draw-knife, spoke-shave, or plane, one must remember that there

are four different directions in which to pare. If the circle is thought of as a map with the grain running east and west, the paring is done from the north down toward the east and the west, and from the south up toward the east and the west. If a wheel is made of two or more thicknesses glued together, each circle should be



THE DOG

THE GOAT

pared as well as possible before gluing, and then finished with a rasp or file after the glue is dry.

The stock for the first running wheel (Plate 10), which we will name "Skinny," is as follows:

Wheel, 5 inches diameter by ¾ inch thick.
Handle, 30 by 1¼ by ¾ inch.
Body, 10 by 1 by ½ inch.
Arm, 11 by ½ by ½ inch.
Shoe, 2 by 1 by ¼ inch.

Washers are used under B and C and at the center of the wheel. C is 1¼ inch from the center of the wheel.

The goat or the dog (Plate 10) may be used in place of "Skinny," with the fore leg even longer than as drawn.

Stock for the second wheel:
Wheel, 5 inches diameter by ¾ inch thick.
Handle, 30 by 1¼ by ¾ inch.
Connecting rod, 12 by ½ by ½ inch.
Boy, 6 by 6 by ½ inch.
Top block, 5 by 1 9/16 by ½ inch.
Side block, 5 by 1¼ by ¾ inch.
Two pieces tin, 2½ by 1 inch.

The top block is nailed to the side block and then to the boy before the two pieces of tin are bent around the handle and tacked to the two blocks. The handle must slide easily between the tin and the blocks. A large size screw, about 1¾ inches No. 11, is slipped through the center of the wheel and screwed fast in the handle.

WATER-WHEELS

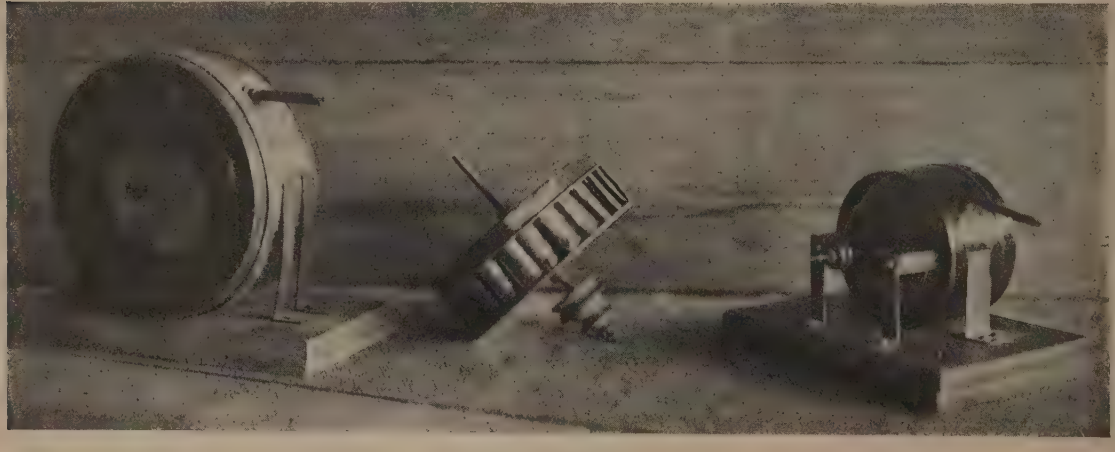
BY F. P. REAGLE

DIFFERENT ways of harnessing waterpower so as to make it do the work of man have been devised and studied almost since the beginning of history. Many primitive peoples have seen and taken advantage of this water, ever flowing from the high places in the mountains and hills to the sea, and capable at every foot's drop of developing irresistible power. Our primitive people have, in a primitive way to be sure, taught us lessons in using this power to grind corn, lift water, and save effort in many lines.

Boys will find this harnessing of waterpower to run toy machines and miniature mills a very interesting study. Water-wheels as described and pictured in this chapter are either undershot, breast, or overshot—depending on where the current or fall of water hits them—or Pelton and turbine wheels if a supply of water under high pressure is available, as in most city and town water-mains.

UNDERSHOT WHEELS

Three simple undershot wheels are shown in (Figs. 13, 14, 15). If made large scale, to be used in the current of a small stream of water, if such is available, the entire stream should be run through the sluiceway. If made of toy size, the water from a garden hose turned through the trough will suffice for power. The writer



remembers one similar to Fig. 16, set up in the current of a small stream of a relative's farm, and hitched up to a pump by means of a long wire. Sketch at Fig. 17, will explain this installation. The construction of these three wheels should be apparent to our young engineer by this

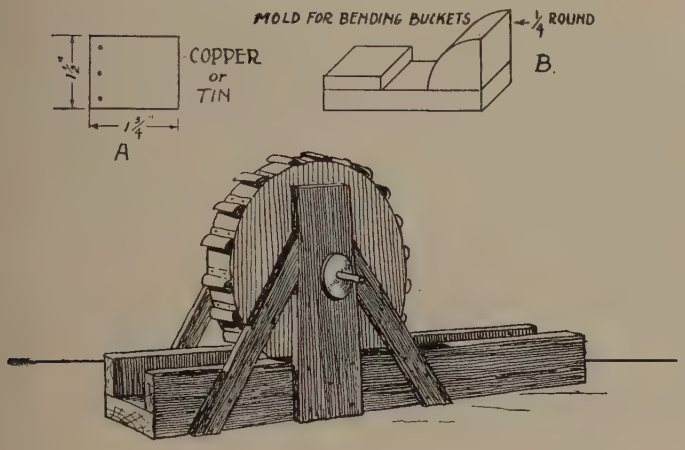


FIG. 14

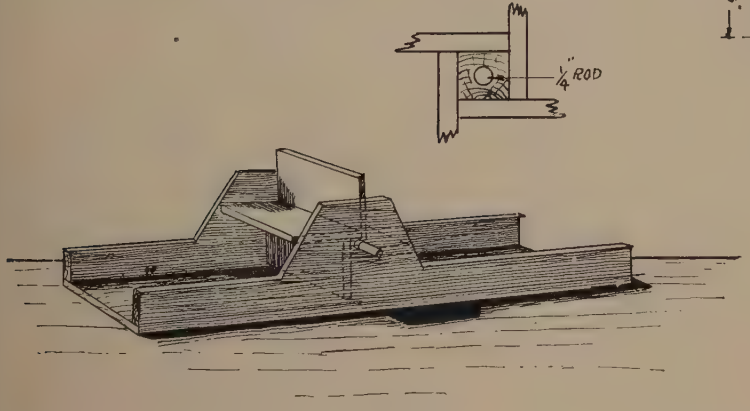


FIG. 13

time, because of his ability to work from the drawings and pictures. The buckets in Fig. 14 are made from small pieces of tin or copper cut out, bent, and nailed fast. In order to make them all alike, cut them to the same sized rectangles first, as at A. Now by making a bending "jig" as shown at B, and hammering them around the piece of ¼-inch round wood, this result will be obtained.

The wheel in Fig. 15 is a small model of those used in some of the Western States. Its striking feature is that the entire wheel can be raised up out of the water when not in use. This is accomplished by making the two bearings so they can slide up and down between the double upright standards on each side.

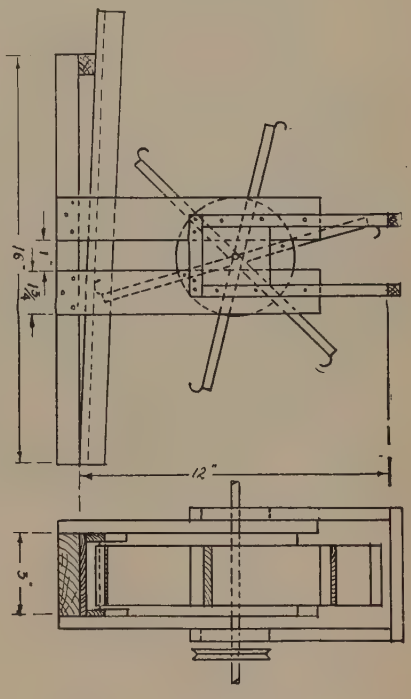


FIG. 15

The ambitious boy might look up in the encyclopedia, or in the bound volumes of the *Scientific American Supplement*, the real machines which this imitates, and see if he can place a small bucket on each paddle so that a little water is raised up by each one, and emptied in a trough at the highest point.

The wheel pictured in Fig. 16 can be used either as an overshot or breast wheel, depending on whether the stream of water is applied to it

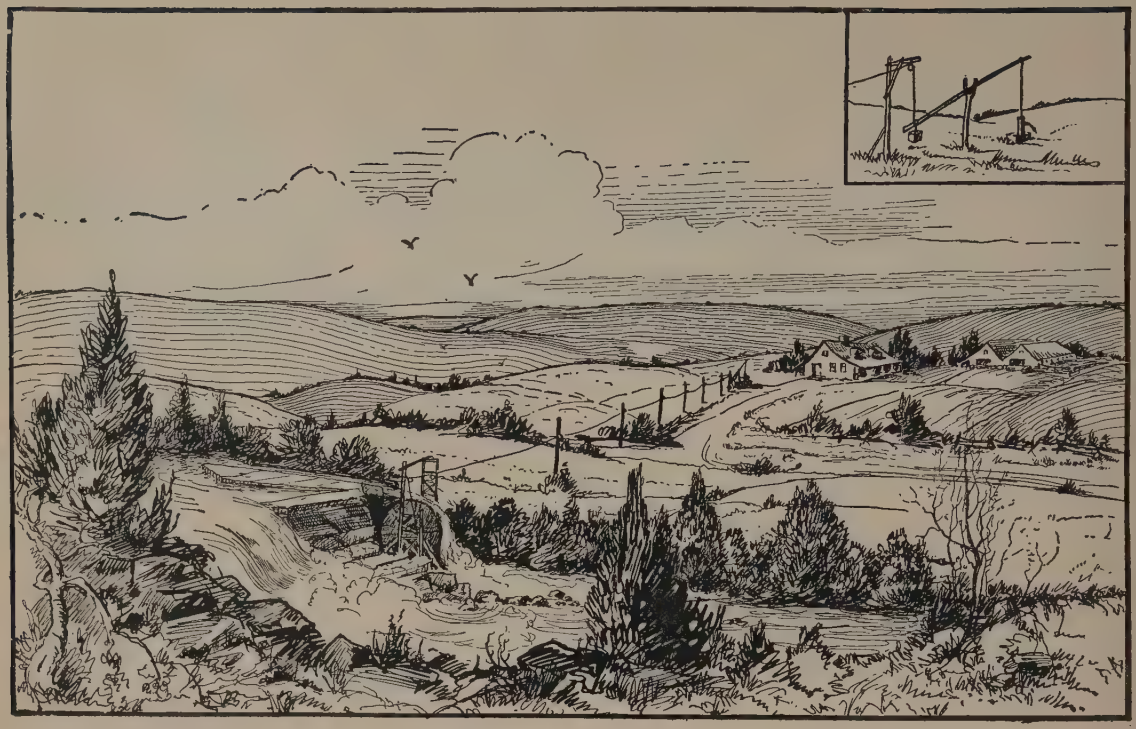


FIGURE 17—WATER WHEEL

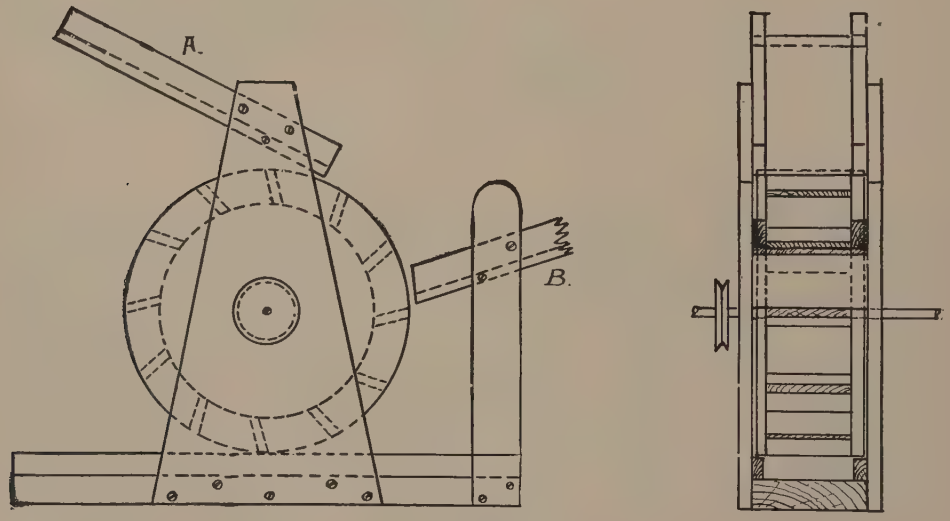
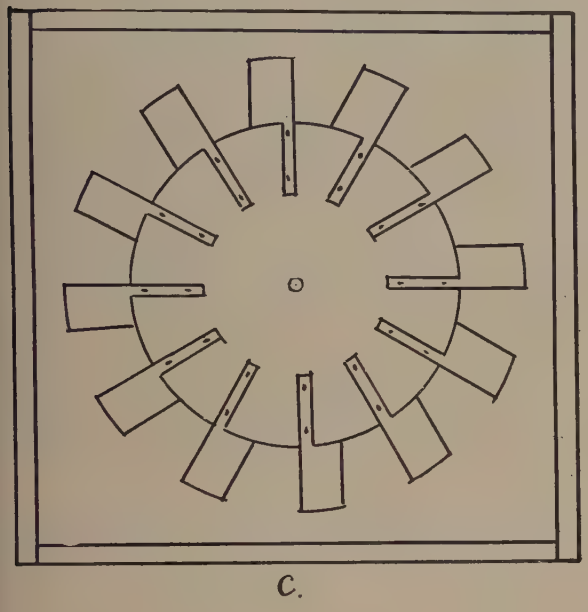


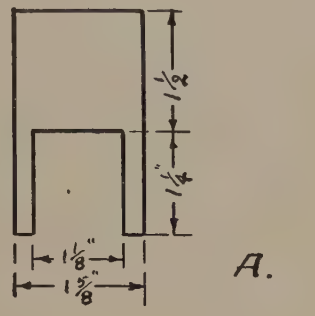
FIGURE 16

through A or B. The wheel in this case can be made out of two circles of ½-inch thick wood, and two of ⅞-inch thick wood, the two ½-inch pieces overlapping the ⅞-inch pieces 1½ inches, or 2 inches all around. Now, nail the two smaller together, and the large pieces on the outside, being careful to have the grain run crosswise with each other, and also to have the center of each piece over each of the others. Procure a piece of tin as wide as the distance between the two outside pieces, and long enough to reach around the smaller, allowing about 1 inch for

lap. Bend this piece around and tack fast to smaller circle.

Now rip out and plane up a piece long enough (a number of shorter pieces can be used provided enough length is procured for all the paddles) to saw up into the desired number of pieces. The difficulty here will be to saw and plane these pieces to the proper bevel on the edges. A new tool called the bevel gauge should be used to test these edges while planing. The rest of the wheel should offer no difficulty. Nail the paddles in place as shown in the drawing from the outside. By attaching a crank rod and pulley this wheel will furnish power to pump water with the simple lift-pump described later.





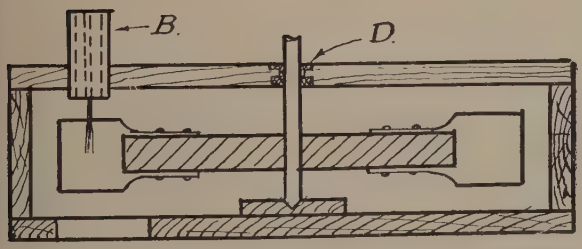


FIGURE 18

THE TURBINE WHEEL

The turbine water-wheel in Fig. 18 is made to run by force of water running through a hose attached to the city water faucet, and connected with water-wheel at B. First a simple box is made out of half-inch poplar, cypress, or soft pine. Get two side pieces ½ inch by 2½ by 8 inches long, and for the opposite sides two pieces 1 inch by 2½ by 7 inches. Nail these together with 1½-inch No. 16 brads, the long pieces overlapping the short ones. Then get out two pieces ½ inch by 8 by 8 inches for the top and bottom. The bottom may now be nailed on with the same size brads, which you will find convenient and best for this type of work. Do not nail the top yet, but out of a ⅞-inch board mark a circle 6 inches in diameter, and cut out with a turning saw, bore a hole in the center with a No. 4 auger-bit, being careful to get it straight. If you are not sure of yourself, place a try-square on the board and square up your bit with it while boring. Now lay off marks on the round piece you have just made similar to the drawing C. Notice that they all radiate from the center.

Cut twelve pieces of tin similar to the drawing A, and hammer them over a piece of 1½-inch pipe; punch three holes in the long ends and nail to the round piece. They should be nailed so that they slant about 45 degrees in order that the water coming through at B with force will strike the slanting part of tin blade and thus force it around. A small piece of ½-inch wood about 1½ inch square is nailed to the bottom with a countersunk hole, to act as a bearing for the little piece of ¼-inch iron rod that is now placed through the wheel projecting on the under side about ½ inch. It will work better if the rod is slightly tapered on one end as shown in the drawing. Also after boring a hole in the center of the top, so that the rod will work freely in it, it might be improved by putting babbitt metal in. This lessens the friction; see drawing at D. Now if you will fit a piece of pipe, or better still, a hose coupling, at B, after filling it with hot lead, and drilling a ⅛-inch hole in it so that you will not get too big a stream of water flowing through, you will be ready to nail on the top. Underneath where the water enters, a hole should be cut in the bottom about 1½ inch square to allow the water to escape. This tin-can turbine will attain high speed, but will not develop much power.

THE PELTON WHEEL

The Pelton water-wheel (Fig. 19), gets its power through a small stream of water entering the top of the box under pressure and striking the paddles squarely in the middle. The box is made similar in construction to the one described for the tin can turbine, only that this one is made narrower (about 1⅜ inch on the inside). The wheel is made of ⅞-inch wood, and a hole bored in the center with a No. 4 auger-bit to receive a ¼-inch iron rod for an axle. The buckets are cut from sheet copper 16 gauge, or sheet iron about 15 gauge 1½ inch square, then marked and cut as in drawing A, and bent and punched for nails as in B. The round part is hammered over a piece of 1-inch pipe with a ball peen hammer, as shown in drawing C. These are equally placed and nailed top and sides on the wheel as in D.

E shows method of pouring hot lead into hose fixture after pointing a dowel stick and inserting it in fixture until point projects slightly. When the lead is poured and the dowel stick removed you should have a hole about ⅛ inch in diameter. This fixture can be screwed onto a faucet the same as a hose. A hole is cut in the bottom

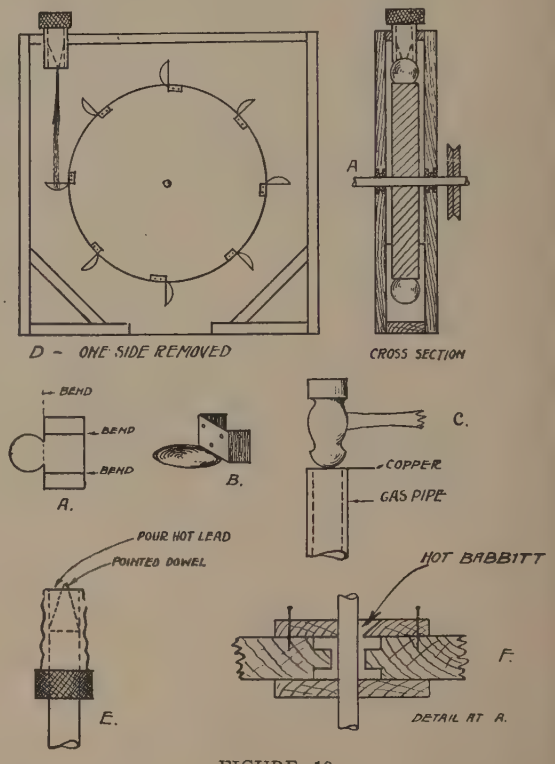


FIGURE 19

about 2 inches long to let the water escape, and braces put on the inside as shown in D to prevent the water choking at the corners, and to strengthen the box. With ordinary city water pressure this wheel should turn over a thousand revolutions per minute.

The method of pouring the babbitt metal, which greatly adds to the speed if done carefully, is shown in drawing F.

This water-wheel will furnish enough power for a small emery wheel attached to shaft and also for innumerable mechanical toys.

PEG TOPS AND NOISE MAKERS

BY HARRIS W. MOORE

THREE peg tops are suggested in Plate 11, two made of spools, and one of a button mold. Button molds are wooden disks which mother sometimes covers with cloth to make buttons for sister's dress. If the tops are colored brightly in circles, a number of them spinning on a plate make a lively scene. To make one easily from a big spool first make a dowel to fit tightly in the spool about 2 inches longer than the spool. Now hold it in the vise endwise, and with a cross-cut saw make a slanting cut nearly to the center of the spool; then turn it over, and saw again. If this is done four times, there will not be much shaping necessary with a knife. In small whittling jobs like this, it is well to allow some stock for a handle while whittling, the extra length to be cut off later. A pin in the point, as in the color top, allows it to spin longer.

COLOR TOP

With a color top one can study how colors mix to form other colors. Begin with black and white and the three primary colors, red, yellow, and blue. The hole for the wedge is somewhat bigger than the wedge, and its lower part is just below the upper surface of the wooden disk, or wheel. This wheel can be cut with the circle cutter (Fig. 12).

FLYING TOP

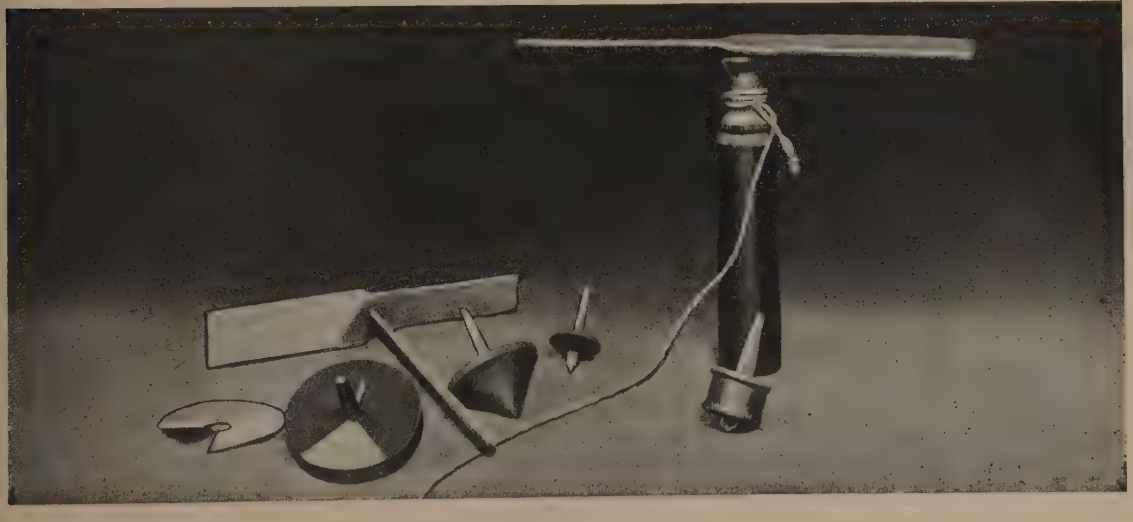
If a boy has never made one, a flying top will surprise him. If it is painted in bands crosswise, it will make colored circles as it flies away. It offers a good stunt in whittling to cut it thin, and still not cut away the edge to be saved. The hole must be bored true, or else the top will not fly steady. It is made to fly by twirling the dowel between the palms of the hands.

FLYAWAY

The flying part of the flyaway can be made of wood, tin, or even of cardboard. Notice that it is narrower in the center. Why? The three holes must be bored in it to fit loosely the three brads, one in the center of the dowel, and two in the top of the spool. This flyaway will fly higher than the flying top.

NOISE MAKERS

These noise makers (Plate 12), will please a lively, red-blooded boy, though they may not



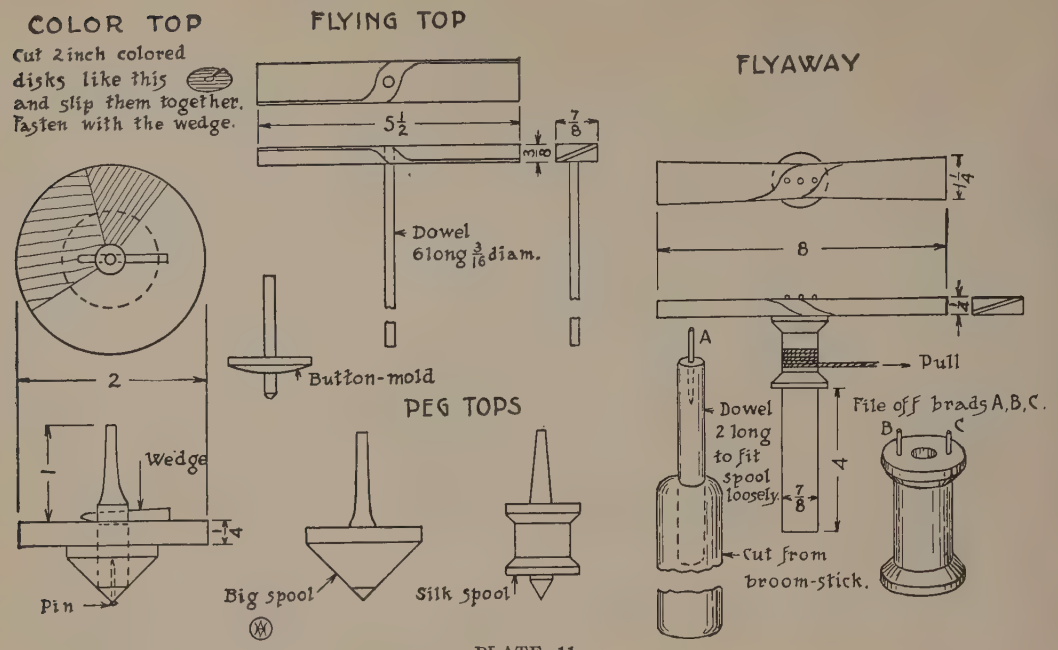


PLATE 11

please his elders, so the boy must be thoughtful as to where he uses them. The rattler will find a place in some celebration, and these models offer some good problems in woodwork.

TOM-TOM DRUM

It may interest a boy to discover in the tom-tom drum what woods give out the best sound, and how thick they are when loudest. What wood is commonly used for the sounding-board in violin, cello, or piano? The sizes for the one illustrated are:

Two sticks, 3¼ by ⅜ by ¼ inch.
Two sticks, 2 by ⅜ by ¼ inch.
Two sounding-boards, 3 by 2 by ⅛ inch.
One dowel, 3 by 3/16 inch diameter.

The parts should be glued as well as nailed. Why is this better?

NOISE-MAKERS

BONES, OR CLAPPERS, AND RATTLE

The bones offer fine experience in shaping hard-wood, for they must be very smooth when finished. The inner curve is shaped first. A bench hook is good to hold the piece while chiseling this curve. The outside curve can be made with draw-knife or spoke-shave, and both sides smoothed and rounded with file and sandpaper. A close-grain, resonant wood should be chosen for bones, as rock-maple, cherry, apple, hard black-walnut or mahogany.

The rattle is a sort of wooden tuning-fork, and should be made of hard, resonant wood, 8½ by 1¼ by ⅞ inch. A ¼-inch hole is bored through the piece, from edge to edge, 4 inches from the upper end; then two cuts are made down to this hole with a rip saw. A saw can be "aimed" at its mark by holding the stick nearly horizontal in the vise, and sawing with the handle of the saw over the line which it is to follow. Watch the saw key on each edge of the stick. Work slowly enough to saw correctly, for this is a rather difficult slot to cut out. The handle can also be cut narrower with the rip saw. Double-pointed tacks cannot easily be driven into hard wood, unless little holes are drilled for them. The springs must be given a smart bend to hold the knockers at a distance from the wooden tuning-fork.

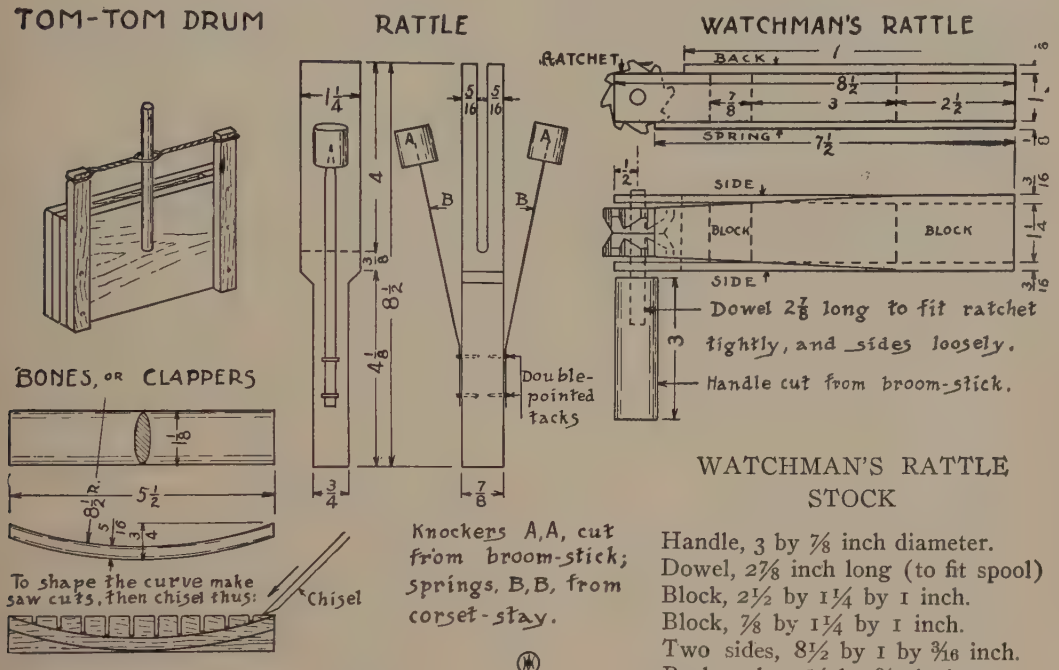


PLATE 12

WATCHMAN'S RATTLE STOCK

Handle, 3 by ⅞ inch diameter.
Dowel, 2⅞ inch long (to fit spool)
Block, 2½ by 1¼ by 1 inch.
Block, ⅞ by 1¼ by 1 inch.
Two sides, 8½ by 1 by 3/16 inch.
Back, 7 by 1⅝ by 3/16 inch.
Spring, 7½ by 1⅝ by ⅛ inch.
Ratchet, 1½ inch diameter by 1 inch.

The ratchet may be made of a stick or a spool. The one illustrated was made by sawing off the ends of a spool and gluing them together on the dowel. The teeth were made with a back-saw, and smoothed with a big flat file. The spring is tapered to fit the length of the ratchet. The following is a method of assembling the parts: glue ratchet to dowel; nail lower side to both blocks; slip dowel through hole in this side; nail upper side to blocks; nail back; nail spring to large blocks only; and last, glue handle to dowel.

CARTS AND WAGONS

BY HARRIS W. MOORE

The cart (Plate 13) is a simple one, and is given with the hope that most readers will not be satisfied with one so small, but will make others bigger and better. Some may want a tip-cart, or a cart with a loose tail-board. Two important things about carts are the wheels and the tongue, or handle. The wheels should be strong, and the tongue should be securely fastened to the cart. The stock:

Two wheels, 4½ inch diameter by ⅞ inch.
Axle, 6¼ by 1¼ by ⅞ inch.
Tongue, 24 by ⅞ by ⅞ inch.
Dowel, 5 by ½ inch diameter.
Two sides, 10 by 2 by ½ inch.
Two ends, 5 by 2 by ½ inch.
Bottom, 10 by 6 by ½ inch.

If a boy can afford a miter box it will help him to saw many things square. One can be made of three true boards, but it requires good workmanship to plane these, and to make the saw cuts just right: perhaps father can do it.

EXPRESS WAGON

This wagon and the auto truck (Plate 14) are examples of vehicles that can be made of cigar-box wood. The axles are made of two strips glued together. The wheels are fastened by a nail and washers. A nail is not so good as a slender screw because it is not smooth near the head; of course, it can be made smooth by filing.

Notice that there are four pieces under the seat—two wider than the other two—so that a brad will hold the seat down. Cigar-box wood smoothed with No. O sandpaper, and finished with linseed oil or furniture polish, looks rich in color.

On these "commercial vehicles" there is, of course, always a fine opportunity for the boy to do some lettering.

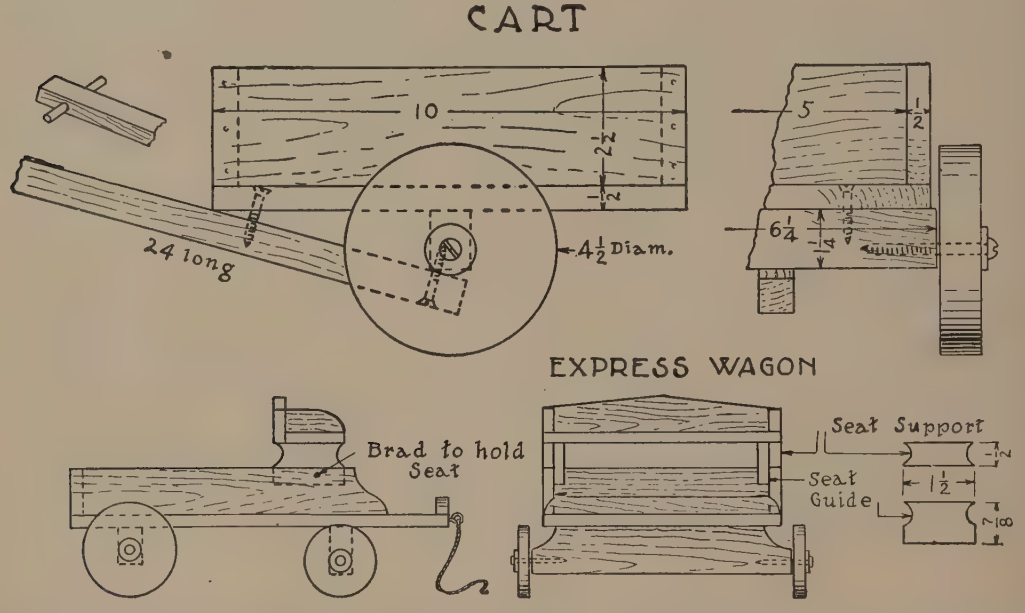


PLATE 13

AUTO TRUCK

It will require some patience for a boy to make a truck like this; but when it is finished he will have a fine-looking auto truck. If the hood is made the size given in the drawing, the other parts can be made to suit this part; or the following stock, 3/16 inch thick, can be used:

Floor of hood, 5½ by 5 inches.
Two sides of hood, 3 by 1½ inch.
Top of hood, 3 by 2½ inches.
Dash board, 5 by 2¼ inches.
Floor, 7½ by 5 inches.
Two sides (lower), 6¾ by 2½ inches.
Two sides, 6¾ by 2¾ inches.
Four posts, 5¼ by ⅜ inch.
Arch piece, 4⅝ by 1 inch.
Arch piece, 4⅝ by ⅝ inch.
Tail-board, 4⅝ by 1 inch.
Two seat pieces, 4⅝ by 1¼ inch.
One seat back, 4⅝ by 1½ inch
Four wheels, 2 inch diameter.
Rear axle, 5⅜ by 1 by ⅜ inch.
Front axle, 5⅜ by 13/16 by ⅜ inch.
Steering post, 2¾ by 3/16 inch diameter.
Steering wheel, ¼ by ¾ inch diameter.

A good way to assemble the parts is as follows: Make the hood and dashboard first; nail sides to posts, then to seat and arch pieces; nail floor to sides and to bottom of seat; nail floor to axles; put steering wheel in place; nail top to arches, posts, and sides. See that sides and posts are filed or cut off slanting to fit the curve. The top can be curved by wetting the upper surface and heating the lower over the stove. Put on wheels, curtain, and tailboard. The tailboard is rounded on its lower edge, and it swings on a pin at each end. Drill a small hole for this pin, having it loose in the body and tight

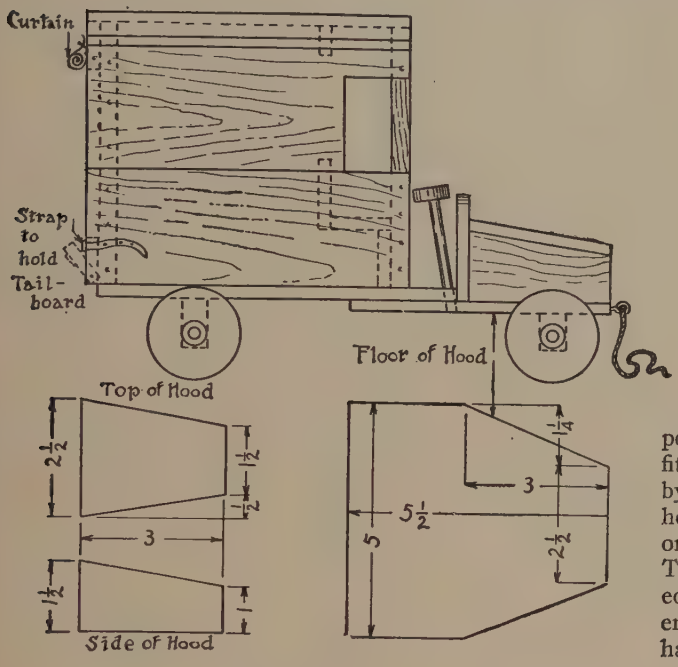


PLATE 14

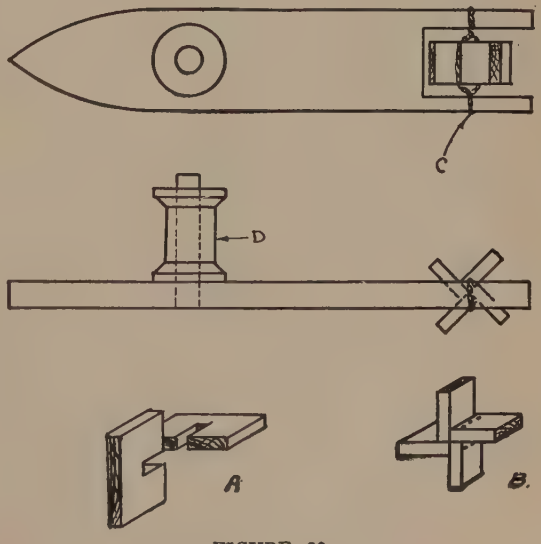


FIGURE 20

in the tailboard. The curtain and strap may be of black enamel cloth.

BOATS

To the boy experimenter the simple boat shown in Fig. 20 will be most interesting. The motor boat with rubber band power should be cut to the desired size, and shaped like the drawing. Considerable variation can be had by attaching cabin, a funnel made from a piece sawed at a rakish angle from a round stick, a wireless mast, and so on.

The back of the boat is cut out U-shaped, as shown, and large enough to accommodate the four-bladed paddle wheel. Large boats driven by paddle wheels in the stern are still used commercially in the United States. The paddle for this boat is made by sawing two pieces of wood which have been made of the proper size to the shape shown in the drawing A, Fig. 20, or it may be constructed of four small pieces as shown in drawing B.

A rubber band, or a number of them, is now placed in niches cut in the two arms of the U at the stern of our boat and the propeller inserted between the opposite strands of the rubber. By twisting up the rubber to the extent allowed by the rubber bands and releasing it after placing the boat in the water it will drive itself through the water like a real boat.

All the toys mentioned thus far can be made with little or no cost to the boy, as the materials mentioned are such as can be procured as rubbish at a store or around the plumber's or tinker's shop.

WIND AND WEATHER GAUGES

BY GRACE VINCENT

WEATHER VANES

The vane given in Fig. 21, A, is made of ½-inch wood, and laid out in one piece. This may be made any size, but the proportions must be kept. A good size is 2 feet for the entire length. The tail is 6 inches wide and 17 inches long. In order to get the curve in the back, bore a hole with a 1-inch auger-bit 3 inches from the end, then curve the lines to meet it, and saw out with a jig saw. The opening in the center is cut out by boring a hole, then taking the jig saw from the frame, passing it through the hole, replacing, and sawing. The rod which holds the vane is made of three pieces of 2-inch wood, two pieces nailed on each side of the tail. These pieces should be long enough to come below the tail about three inches. Between them is inserted a third piece similar in size, except the length as shown in drawing B. Through this third piece is inserted a rod on which the vane turns. To better balance the vane, you may put on the arm a piece of sheet lead fastened with a screw as at G.

A better balanced vane is the one shown in Fig. 21, drawing C. Piece D is made of one piece ⅞ inch by 2½ inches, as per drawing. Arrow is cut on one end, the other is rabbeted to receive two ¼-inch by 2½ inch blades, with a V cut in the end as at E. Nail these blades in the rabbet of the ⅞-inch piece at F. The standard is made of a piece 1¼ by 1¼ inch about 30 inches long. This is rounded down to ⅝ inch

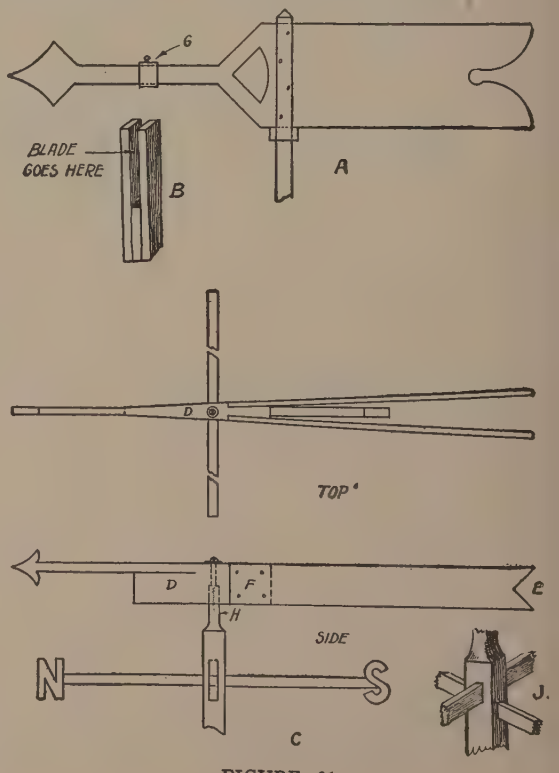


FIGURE 21

for about three inches at one end, as at H. The letters may be cut from tin, and fastened to arms with a ¾-inch nail. These arms are ½ by ¾ inch by 2 feet. A hole is cut in the standard to fit these pieces. They are cut like drawing J, one above the other. Brads are put in to keep them from shifting. Screw the vane to the standard with a 2-inch No. 10 R.-H. screw.

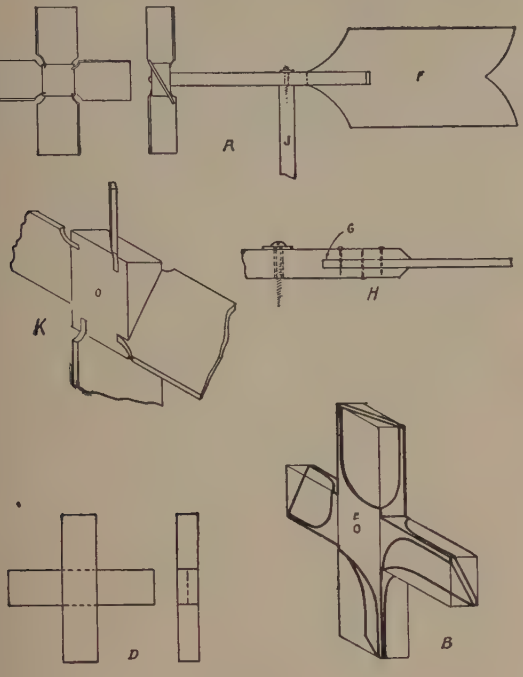


FIGURE 22

WIND-MILLS

There is hardly a boy who at some time does not love to whittle and make things that "go." There are all sorts of weather vanes from the one shown in Fig. 22, drawing A, to very elaborate ones that are made on Cape Cod. Any boy near the coast will want to make "The Happy Jack," which is a sailor lad with arms stretched out and a paddle on each arm. This figure revolves on a rod, and the arms turn as soon as any wind touches him.

Connect the wheel and the tail with a piece of wood ¾ inch by ¾ inch by 10 inches. Screw the wheel to one end of this with a 2-inch No. 8 R.-H. screw, and in the tail-piece cut a slot 2 inches deep and ¼ inch wide. The best way to cut out the slot is to bore a hole at G with a No. 4 auger-bit, and saw on each side to meet the hole. In this insert the free end of the sticks as in detail view at H and put in small brads to hold it. The stick J, on which the vane revolves, should be about 1 inch by 1 inch by 18 inches, tapering the top to fit the ¾-inch stick which rests on it.

KITES

KITES are among the oldest playthings in the world. As long ago as 300 B.C. a Chinese general used kites to signal messages from the army that help was coming to an attacked city. Benjamin Franklin made many experiments with kites.

There are many varieties of kites, but three easily made are described here. Fig. 6 is a kite with a tail; Fig. 7, a tailless kite; Fig. 8, a box kite.

The secret of success lies in the proper shaping and balancing of your kite in its construction, a proper tilting of the kite's surface to the breeze.

The frame-work should be light but strong. In the plain kite, the sticks should be lashed together with string, as nailing weakens the stick. They should be lashed diagonally in both directions with a few rounds between the sticks.

The covering is very important. A heavy tissue paper is good for small kites; for box kites and large plain kites, lining cambric is serviceable.

In drawing on the cloth cover, be careful not to get the goods on the kite too much on the bias, or there will be sagging. The string must be strong. It is as important to the kite as the motor is to an airplane, as it gives a means of control against air currents.

A BROOM-STRAW KITE

There are few boys (or girls, either, for that matter) who are not more or less interested in kites and kite-making. The trouble is, it takes so long to make them, as a rule, that what would otherwise be a pleasure, becomes a burden.

Here is a kite which can be made in less than ten minutes, and without the usual paste-pot, twine, and other "bothers" usual in making ordinary kites.

Take a piece of tissue-paper, wrapping-paper, or newspaper, about nine by ten inches, and, creasing it *down* the middle, fold one half over the other half, as shown in Fig. 1.

With a sharp knife, or a pair of shears, cut along the dotted lines, shown in Fig. 1, and open

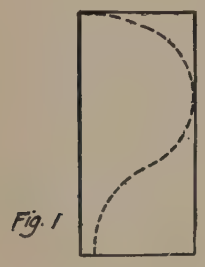


Fig. 1

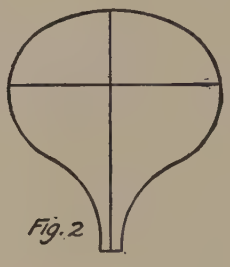


Fig. 2

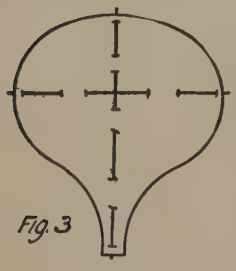


Fig. 3

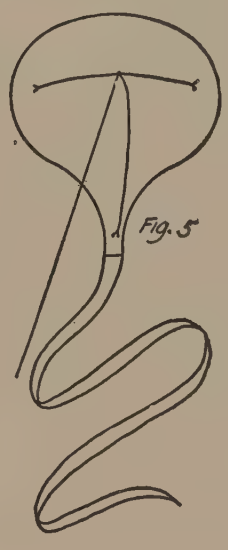


Fig. 5

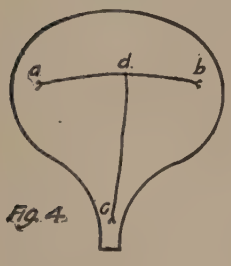


Fig. 4

the paper out, when it will appear as shown in Fig. 2. Crease the paper crosswise, about one-third the distance down, as a guide-line for the straws, as seen in Fig. 2.

Select two long straight straws, from an ordinary American straw-broom, and thread them through the creases of the paper, one up and down, and the other across, as shown in back view in Fig. 3, cutting the straws off flush with the outside edges of the paper.

Next take a needleful of thread, and fasten one end of the thread to the horizontal straw at *a*, passing the thread through the paper to keep it from slipping. In like manner fasten the other end of the thread at *b*, and break it off.

Take another piece, and fasten one end to the bottom of the vertical straw at *c*, and the other end to the middle of the first piece at *d*, shown in Fig. 4.

The flying-cotton, or thread, is fastened to the intersection of these threads at *d*.

A tail, made of about four feet of paper ribbon, about an inch wide, is connected to the bottom of the kite as shown in Fig. 5.

Use fine sewing-cotton for flying the kite, which can be done without much running.

In all probability it will fly at first trial, but if not, perhaps the tail is too long, and should be

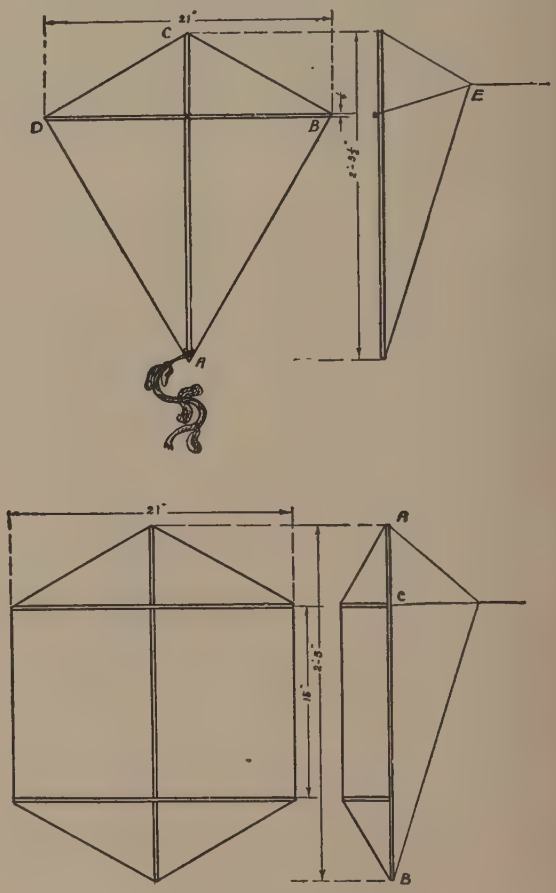


FIGURE 6

gradually shortened, by tearing a piece off the end, a bit at a time, until the proper balance for the kite is found. The band may also need adjusting, according to the force of the wind.

TAILED KITES

Fig. 6, a kite with a tail, is made of a stick about 2 feet 5 inches long, and crossed by one

about three-fourths the length of the first one. It is fastened together with a cord as described. Cord is started at A, and continues around fastening at D, C, and B to A again. Cover with paper. Notice how the cord called the "bridle" is attached at each of the corners. The tail fastened at A is long, and made of short pieces of paper folded up, and tied about the middle with the string of the tail. A piece of cloth finishes it.

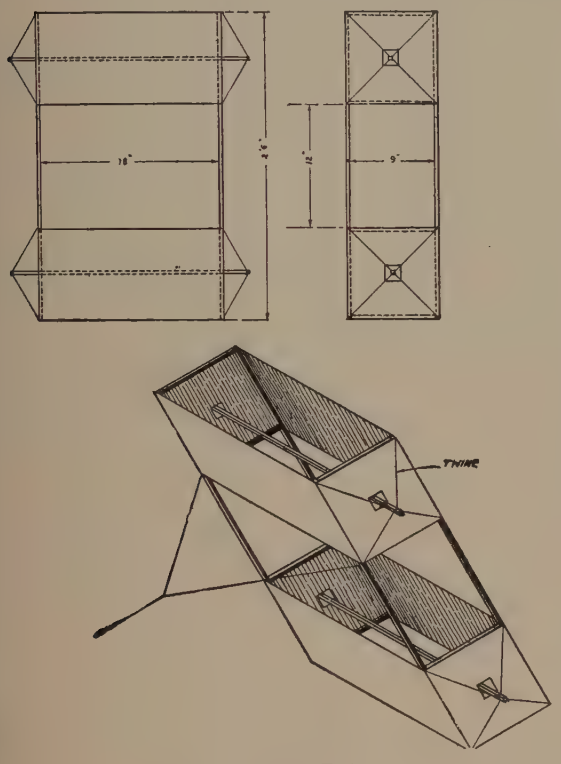


FIGURE 7

TAILLESS KITES

The tailless kite (Fig. 7) must be worked out carefully. This has a vertical stick called a spine, 2½ feet long and two horizontal pieces about the same length. The crosspieces are bowed about 10 per cent. of the length, the upper one the larger bow. String the edge, and cover loosely. The bridle is attached at A, B, and C, where bow crosses the spine.

A box kite has four sticks ¼ by ¼ inch by 30 inches, eight struts ¼ by ⅜ inch by 12 inches, two stretcher sticks ⅜ by ⅜ inch by 30 inches; about two yards of cambric. Cut out the sticks to proper dimensions. Place the corner sticks together, and lay out the spaces for the struts. (The struts are the 9-inch pieces which give the box its shape or width.) Place two corner sticks on the floor and tack each end of each strut in place with a small brad part way. Fasten both ends of one corner stick to the floor, and with a square, square the frame, and fasten the other corner stick down. Glue the corners and drive in the brads all the way. Let the glue set. Do the same with the other three struts. Get out two stretcher sticks 30 inches long. Do not cut them to length until after cloth and loops are fastened in place.

To make the cloth cells, take 2¼ yards of cambric, and pin to the floor smooth and straight. Lay out enough to cover each end of the kite as if it were laid out in one line. Sew the ends together, hem the cut edge.

Make eight loops of twine to stretch up the kite at each end all the same length. Fasten them to each corner of the end of the kite, and bring them to the center diagonally. Make a hole through the cloth in the center of the end of each cell for the stretcher stick to pass through. Notch on end of the stretcher. Stand kite on end with one frame next to you; pass the notched end of the stretcher stick under the loops through the hole, and on through the other side of the kite. Put the centers of the loops in the notch; grasp the centers of the loops next to you and pull on them, at the same time pushing on the stretcher stick. Strain it good and tight, mark stick where loops cross, cut to length, cut the notch and wind with thread. Fix the other stick the same way.

SOME MORE TOYS

BY HARRIS W. MOORE

COASTER

Every small boy likes to ride down hill and he will use any sort of wheel from baby-carriage wheels to roller-skate wheels. This coaster (Plate 15) is planned large enough to afford a good seat, but not long enough for a back rest. In this model the wheels and axles are of most importance and should be made of hard wood. (See running wheels.) To make them run bet-

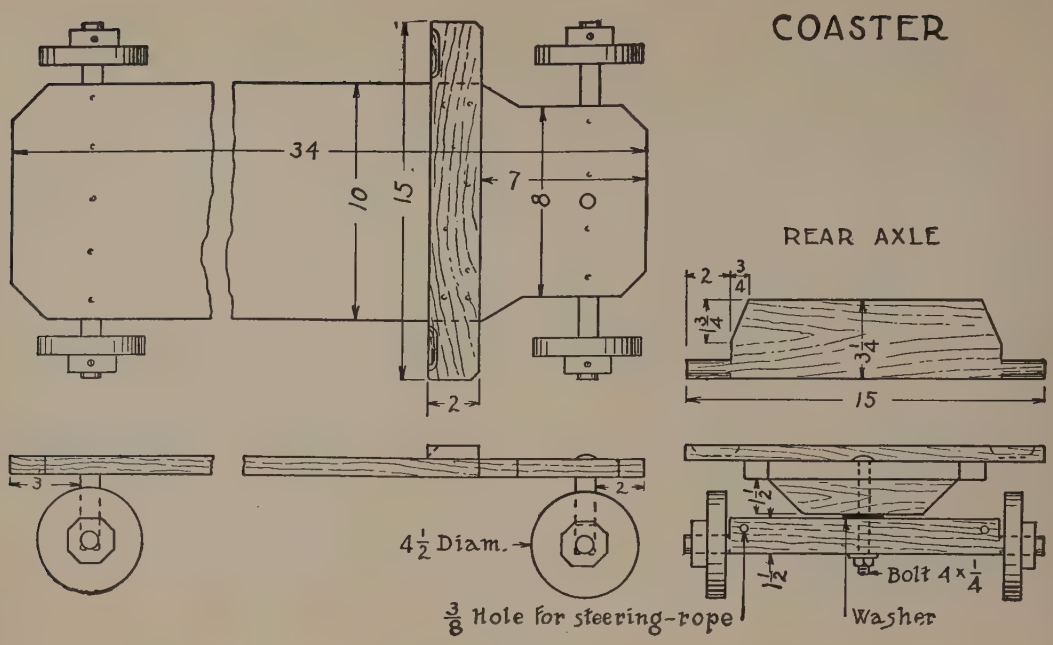


PLATE 15

ter and longer, the axles and hole in wheels should be greased with hot paraffine. This will soak in farther if the wood is hot also. The stock:

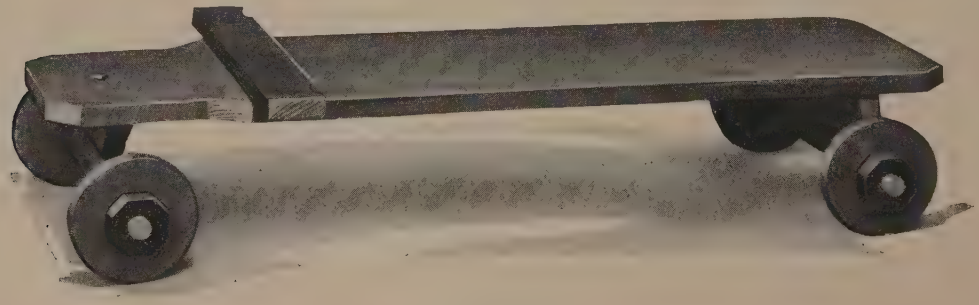
Board, 34 by 10 by ⅞ inch.
Foot rest, 15 by 2 by ⅞ inch.
Rear axle, 15 by 3⅛ by ⅞ inch.
Front axle, 15 by 1½ by ⅞ inch.
Front block, 8 by 1½ by ⅞ inch.
Four wheels, 4½ inch diameter by ¾ inch.
Four washers, 2 octagon.

Other methods may be used to keep the wheels on the axles, but this one is suggested as a strong method, though somewhat difficult to make. The wooden washers help to keep the wheels from wobbling. They are screwed to the axle. A cotter pin (see Plate 5) or heavy brad outside a big iron washer is a good method. The kingbolt should be fast in the board and axle block, but loose in the front axle. To prevent the nut from coming off, the end of the bolt can be hammered, and the threads injured.

SCOOTER

Stock: All hard wood.
Steering post, 30 by 2 by ¾ inch.
Foot board, 22 by 3½ by ¾ inch.
Handle, 6 by 1 by 1½ inch.
Two wheels, 4 inch diameter by ¾ inch.
Bracket, 8½ by 3½ by ¾ inch.

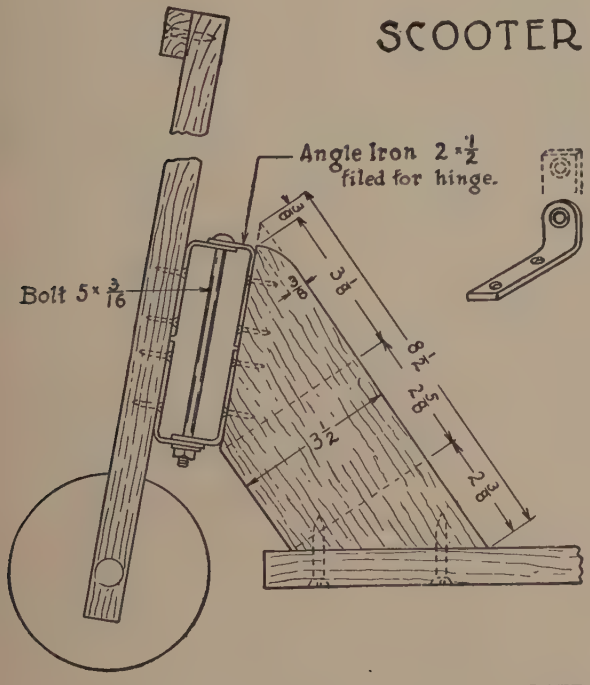
With a scooter like this (Plate 16) what boy would not like to go on errands with his knap-



COASTER

sack on his back to carry packages? To cut the slots for the wheels, first bore a hole 3 inches from the end of the steering post and the foot board, then carefully saw straight to the sides of the hole. Care must be taken to bore the ¼-inch hole for the axles of the wheels straight, especially in the foot board. Large screws fasten the foot board to the bracket. To lay out the bracket, measure from the upper end of the board 3½ inches (3⅛ by ⅜ inch), and draw a line square across, then connect the upper corner with the end of this cross line; ⅜ inch from the upper end draw another line square across. Where it crosses the starting line is the upper end of the curve of the bracket. The lower end is made by a line which slants 2⅜ inches. Screws ¾ inch are long enough to hold the angle irons to the bracket and the post. Two short stone bolts can be used in place of the one long bolt. To locate the place to screw the irons to the post, the parts will have to be held together in such position that the foot board will be level. The handle should be rounded on all edges which do not touch the post. The wheels will last much longer if a tin or hoop-iron tire is nailed on, and if a bushing (a short length of metal pipe) can be forced tightly into a hole in their centers.

SKATEMOBILE



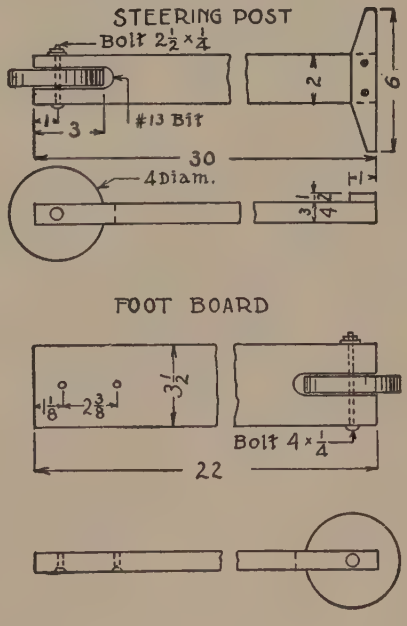
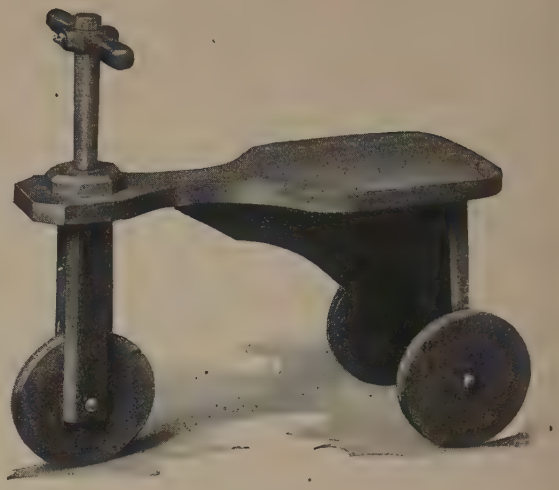


PLATE 16

KID-CAR (PLATE 17)

Seat, 20 by 9 by ⅞ inch.
Brace, 12 by 7 by ⅞ inch.
Rear axle, 9 by 7 by ⅞ inch.
3 wheels, 6 diameter by ⅞ inch.
Wheel post, 9 by 2 by 2 inches.
Steering post, 10 by 1 inch diameter.
Steering bar, 9 by 2 by ⅞ inch.
Collar, 3 by 3 by ⅞ inch.



KID-CAR

The height of this car should be varied somewhat to suit the rider by changing the length of the axle and the wheel post. The wheels, collar, and posts should be of hard wood. If a broomstick is used for steering post, the various holes through which it goes should be made to fit it.

Few boys are strong enough to bore 1-inch holes in hard wood, so some strong helper will

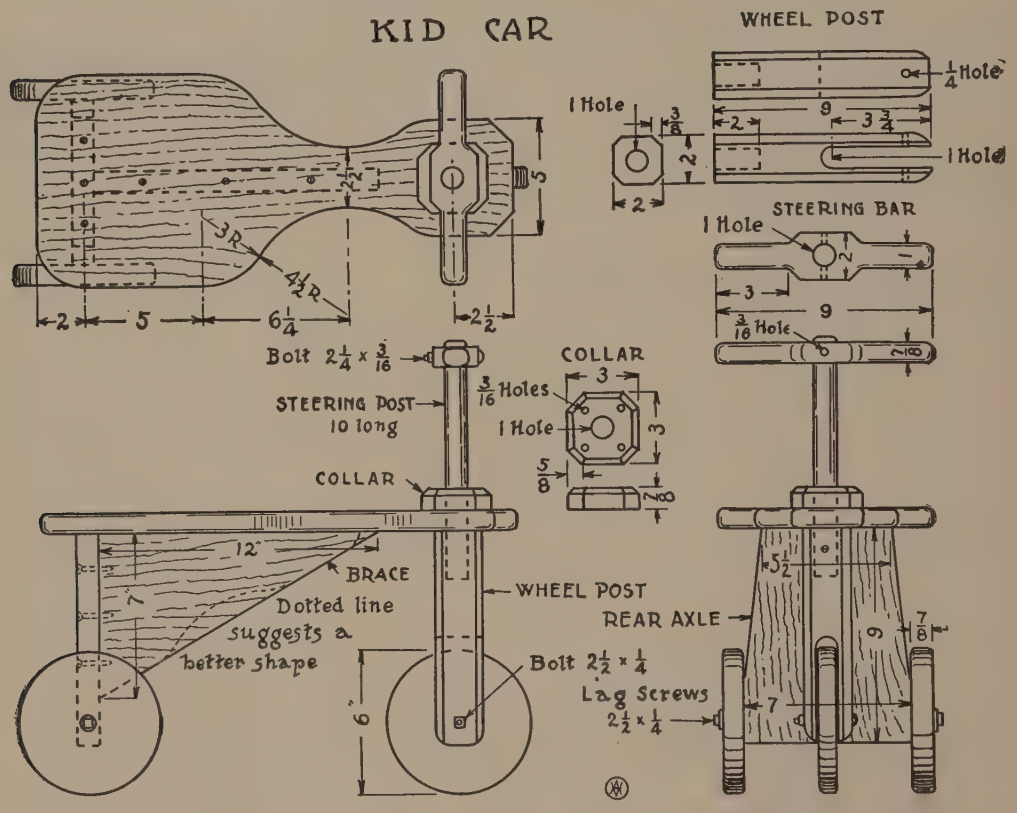


PLATE 17

have to bore them. The collar is screwed to the seat, the seat to the brace and the axle, and the axle to the brace. Steering post and wheel post are glued together, and a screw put part way through them. The ¼-inch hole through the wheel post, for the bolt on which the wheel turns, must be bored very carefully, so that the wheel will turn without wobbling against the sides of the slot in the post. Holes must be bored in the axle for the lag screws which hold the

rear wheels. A No. 7 gimlet bit is the right size to bore the holes for these screws. The seat can be cut out with a turning saw, or to a large extent with cross-cut saw, if cuts enough are made (see Clappers, Plate 12). The edges

Fig. 11, will be a good aid in making the groove straight: and a gun with a crooked barrel—who wants it? The groove should be well sandpapered by wrapping some sandpaper around a pencil or dowel. The stock and the barrel should

PLATE 18

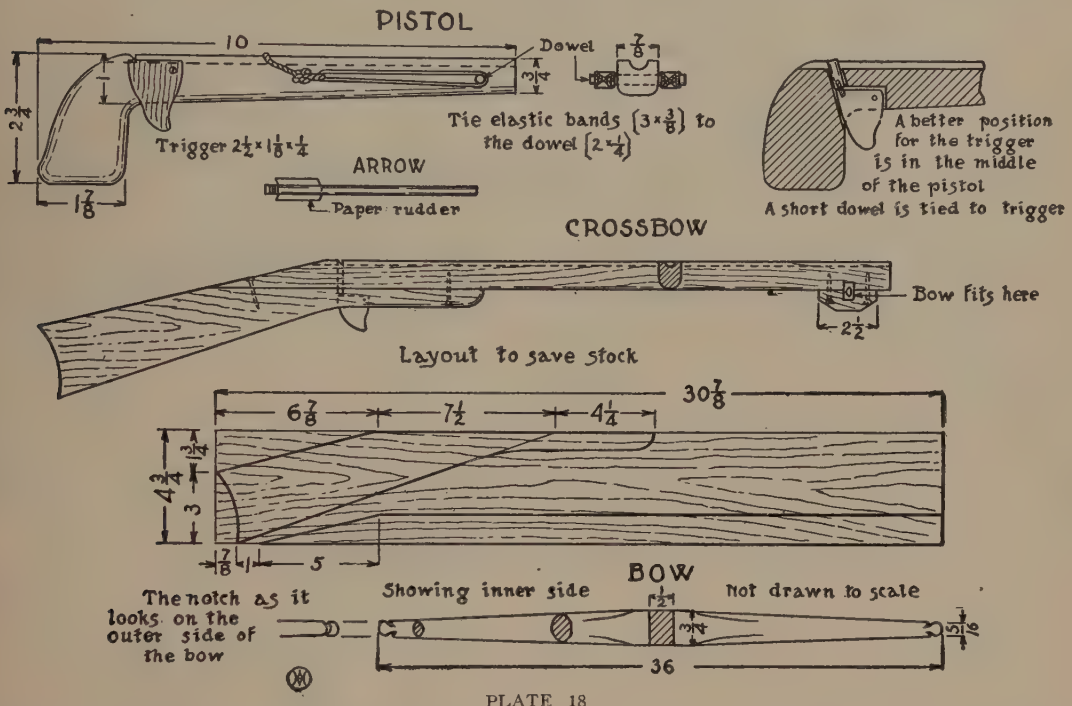


PLATE 18

should be rounded and quite smooth. The steering-bar also should be rounded and smooth.

PISTOL-CROSSBOW

What boy does not like to shoot? But with these (Plate 18), as with any weapon, a boy must be careful as to how he shoots. In some places it is against the local law to use an air-rifle, sling-shot, or bow on the streets. Stock for pistol:

Pistol, 10 by 2¾ by ⅞ inch.
Trigger, 2½ by 1⅛ by ¼ inch.
Dowel, 2 by ¼ inch diameter.
Two elastic bands, 3 by ⅜ inch.

To make a groove in the barrel of the pistol a round plane is best; but a boy can make it with a gouge and round file if he takes time enough. To make it this way a straight groove (of rectangular shape) in the center of the edge of the board is a great help. A tool made of a nail which has been filed like a chisel, as shown in

have well-rounded edges. The cord used to stretch the elastics back to the trigger should be large and firm, like a fishline or top string. The trigger is of hard wood well smoothed. After it is screwed to the barrel so that it moves just easily enough, a notch is cut in the barrel so that it will hold the cord, and still allow the trigger to push it up when ready to shoot. To be sure of making this notch correctly, a boy had better cut some in the edge of a board and see if they will hold the cord just right. Small arrows are best for shooting straight. They can be made of dowels, skewers, or lolly-pop sticks.

CROSSBOW

Some wonderful crossbows are still preserved for us in the museums. Have you ever seen one? If a boy has a board 6 inches wide to use for this gun (Plate 18), he will not need to use two pieces as suggested in the lay-out. The trigger should let into a pocket (mortise) in the center of the gun stock. To make the pocket,

bore first a ¼-inch hole down from the groove, and then bore a row of holes close together in front of this one long enough to admit the trigger. These holes should be bored upward about ½ inch. A chisel is used to smooth the walls of this pocket. The trigger should be about 1½ by 1¼ by ¼ inch, and should have a small dowel tied to its corner, as shown in the sectional drawing of a pistol. The notch must be made with great care just opposite the center of this dowel.

CROSS-BOW

White ash and hickory are good woods for bows. The wood should be tough, and of straight grain. Hoe and rake handles are usually made of white ash. Eskimos, who can get no better wood than dry, brittle driftwood, still make strong bows by wrapping the whole length of the bow with sinew. A bow should be shaped first with a plane to a tapering stick with rectangular section, as shown in Plate 18, directly under the word "bow." Next the inner or nearer cor-

DOLL'S BED

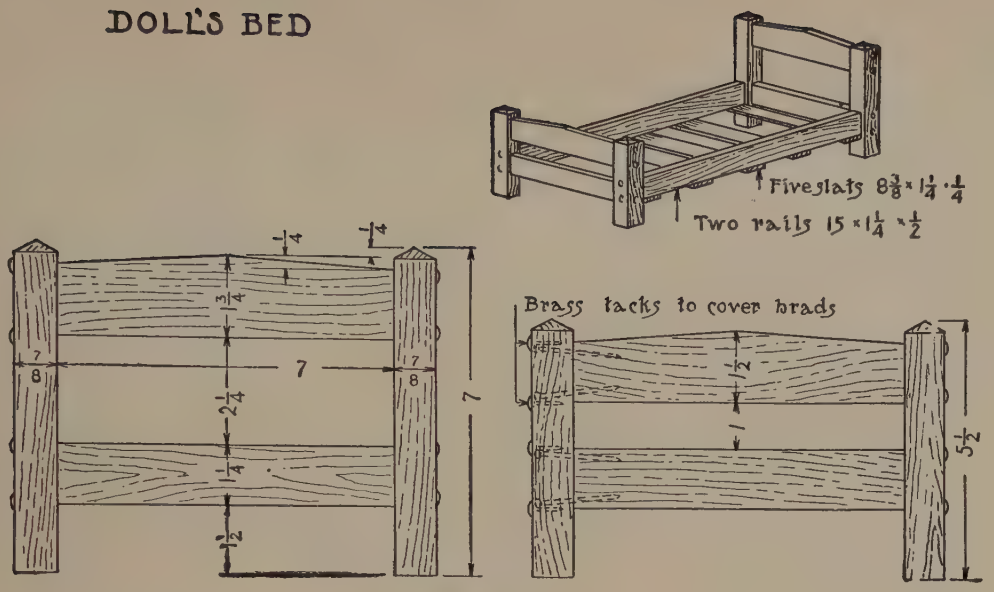


PLATE 19

SHOE-POLISHING CABINET

ners are planed, then the outer ones, and the shape gradually made like the other two sectional drawings. The bow should be filed and sandpapered smooth, and then oiled with linseed oil, paraffine, or tallow, or other grease. A bow when well shaped bends somewhat more toward its tips than in its center. A bow for archery can be made like this in general, except that the center is not made rectangular, but somewhat egg-shaped, like the section under the word "side" Plate 18. A hard, strong, cord must be used for the bow-string.

DOLL'S BED

The bed suggested in Plate 19 is simple in its construction, but if made of wood with a good grain, like oak or chestnut or hard-pine, and stained a mission color, it looks well. Unless the ends of the rails are flat and exactly square, and the corresponding members exactly the same length, this construction will not go together well. A miter box is recommended for cutting the ends true, and the corresponding parts the same length. A boy should learn to plane the end of a board, especially a small one like these parts, true and square by using a block plane and bench hook or shooting board. Short boards can be planed true on their edges in this same way. To locate the holes for the 2-inch brads, place a rail where it belongs, and trace a line around it, then drill small holes from near the ends of the oblong thus traced outward, and somewhat slanting. The

proper way to glue ends of boards like these rails is to put some glue on the end, then wipe it off after a minute or two, and allow what remains to soak into the wood, and dry a few hours; then they are glued again, and nailed in place. The brass tacks should not be driven till the wood is stained (or painted, if desired) and dried.

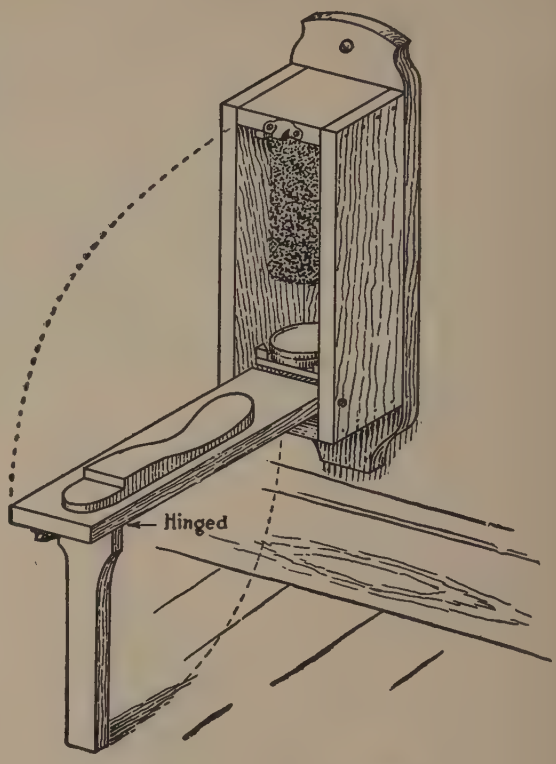
BLACKING CABINET

This is a pleasing variation from the usual blacking box, and to be successful needs only a suitable wall space on which to fasten it. The back and the leg offer places for one's own design of curves or straight lines. The door is pivoted on two round-head screws, turning easily in the sides of the cabinet, but being fast in the door. Two screws hold the cabinet to the wall. Size of parts:

One back, 23¼ by 6 by ⅞ inch.
Two sides, 17¾ by 4 by ⅞ inch.
One door, 16 by 4¼ by ⅞ inch.
Two ends, 4¼ by 4 by ⅞ inch.
One leg, 13 by 2¾ by ⅞ inch.
One shelf, 4¼ by 3 by ½ inch.
One foot-rest, 10½ by 2 by ⅞ inch.
One door stop, 1 by 1 by ½ inch.
Two corner blocks, ¾ by ¾ by ½ inch.

A brush and a dauber can be hung inside the cabinet.

BLACKING CABINET



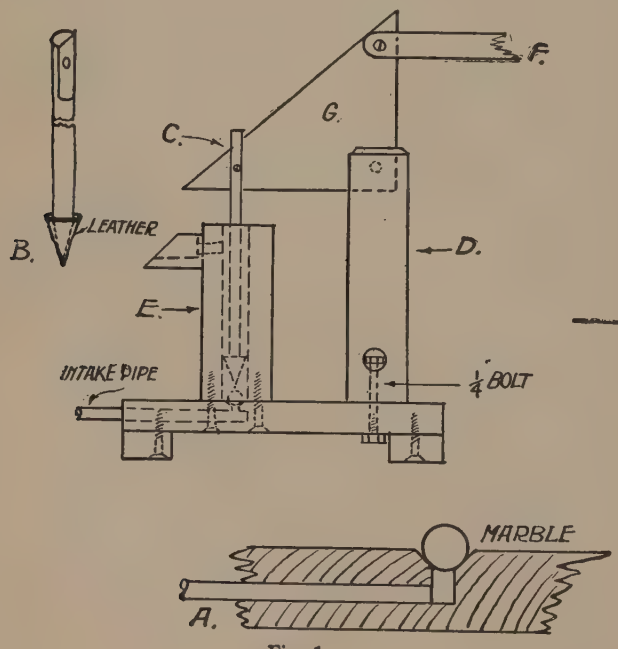


Fig. 1

LIFT PUMP

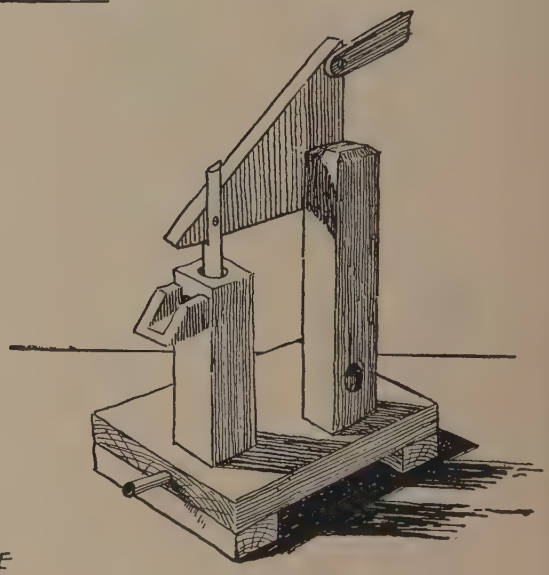


Fig. 2

WATER-PUMPS

BY R. T. JOHNSTON

A LIFT pump is shown in Figs. 1 and 2 (page 332). This can be made first by squaring up a piece of ½-inch wood 4 by 6 inches, and screwing two cleats, one on each end, ½ inch by 1 inch by 4 inches, to keep it from warping. Next, obtain a piece about 1½ inch square and bore a hole through it lengthwise with a No. 12 auger-bit. About ½ inch from the top bore a hole with a No. 4 bit for an outlet into the spout. You can insert a piece of pipe, or make a spout of wood.

A detail of part of the base is shown in drawing A. A hole is bored lengthwise in the middle of the base, and meets a hole of the same size over which piece E is fastened by screws from the bottom or angle braces attached to the sides and to the base. This hole in the base is countersunk so that a marble will act as a check valve as shown in drawing A. The lift is made from a ¼-inch dowel rod with a small piece of leather fastened to the pointed end as at B, and part of the upper end cut away so as to make a better joint at C. A little piece of pipe is used as an intake pipe as shown at A.

D is made of ⅞-inch wood, and should be slightly higher than E, and held firmly to the base by a ¼-inch draw bolt, as shown in the drawing.

The power is transmitted at F, which works G on a loose bolt fastened to D. The joint at C should also work freely.

SUN DIAL

SUN DIALS

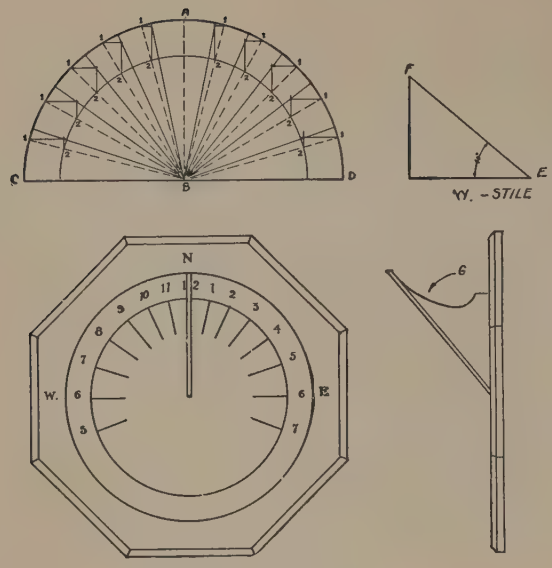
AT ONE point of the world's history the sun dial was practically the only means of telling time. With all the clocks, watches, and mechanical devices we have now we wonder how they did it.

One objection to the dial was that it could be used only out of doors, and in clear weather.

Dials were made so they could be used on a post or any flat surface, or on the side of a building. The one shown in Fig. 3 is for a post, and can be made out of scrap wood. The base is of ⅞-inch wood, 14 by 14 inches (may be different sizes), and the corners cut off, making an eight-sided figure.

Fig. W is called a stile or gnomon. Before making this, one must know the latitude of the place in which he lives. This may be found in any geography, or any teacher will help a boy to lay out the figure, and explain the way the dial works. The angle at E in drawing W represents the latitude of the place (New York, in this instance). The back of the stile may be cut away as in drawing at G, as long as the angle at E is not changed.

For the face of the dial draw the line AB, then the line CD at right angles to AB. The points C and D will be your six o'clock points. Where the lines cross at B, draw a circle with radius EF, in Fig. W. Then another circle with radius equal to the base of Fig. W. Divide your half circle into six equal parts, then each of these into two equal parts, making twelve as points



SUN DIAL
Fig. 3

1, 1, dotted line. The inside one the same, 2, 2. Draw lines parallel to CD, from each of the points of division in the two quarter circles, then draw lines parallel to AB, from each point 2 on the inner circle.

Marking the points where the lines cross, from the central point B, draw lines across the intersection, and where these lines cross the circles will be your hour-points. The half and quarter hours may be made the same way.

In laying out a dial in this way no allowance has been made for the width of stile. If a thin stile, like 1/16 inch, no allowance is made, but if 3/16-inch or 1/4-inch wood is used, then instead of line AB, there must be two parallel lines the same distance apart or the width of the gnomon, and instead of using B as a center for the compass, two semi-circles must be made. An easier method would be to cut the draft into two equal parts along the line AB, and place between them a strip of paper the width of the gnomon.

STEAM-ENGINES

BY R. T. JOHNSTON

UNDER this heading we will endeavor to show the young mechanic how to build three different types of steam-engines. It will be necessary to use more metal, and this will bring in problems of cutting, filing, and soldering. Hero's engine is the simplest, and we will take that up first. Obtain a good tin can of the Karo syrup type, with a removable top. The base is made of 1/2-inch wood about 5 inches square, the upright of the same material about 1 1/2 inch wide and 8 inches long, and the top piece 1 1/2 inch by 6 inches. Square up your pieces to size, and fasten together with 1 1/2-inch brads or 1 1/4 No. 6 R.-H. wood screws. Fastening with screws will make the frame work stronger. Now obtain a darning needle or hat pin about 9 or 10 inches long. Punch a small hole in the center of the top and bottom of the can; be sure you punch the hole exactly in the center so as to obtain an even motion when in operation. Now insert the steel darning-needle or hat pin so that it projects about 1 1/2 inch from the top and 2 1/2 inches from the bottom of the can. Be sure the top or lid of the can is on tight; after doing this, solder with soft solder the steel needle to the top and bottom of the can. You might get pointers on

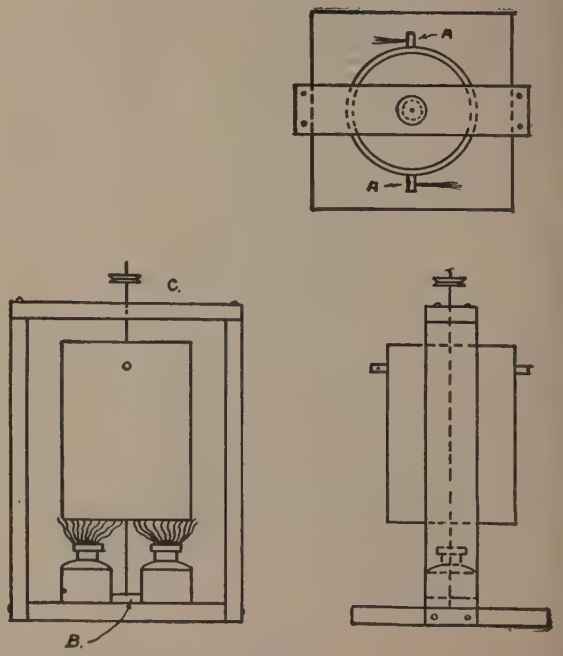
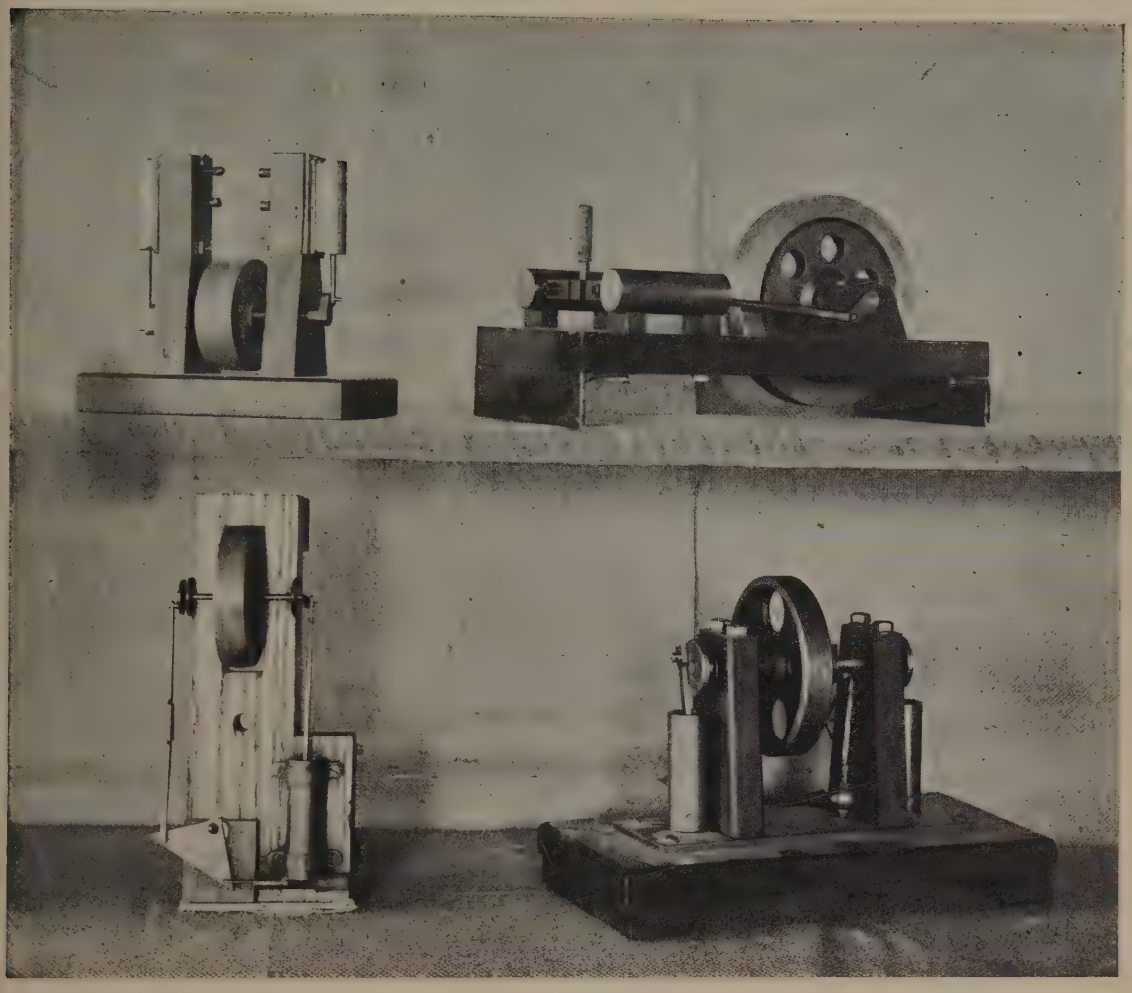


FIGURE 1



TOY ENGINES

soldering from your nearest tinsmith, but with a little practice you will soon become quite expert. You can buy flux or soldering fluid from a tinner's shop or an electrician's supply store, or you can make it yourself by obtaining some muriatic acid, and adding it to water, about ten parts water to one of acid; then put in some scraps of zinc until it will not dissolve any more. A glass jar with an open top is best to mix this in. After the zinc is dissolved you can keep it in a corked bottle.

Apply this flux with a small brush to the parts you are about to solder. Get a good soldering iron, and heat it almost red hot, then tin it; that is done by rubbing it on a board sprinkled with a little sand. Apply a little flux to the iron, then melt some solder on it. When it holds solder on the four sides of the point, it is in good working condition. Now apply the flux on the tin in the place to be soldered; that is, put a small layer of solder so that it lies flat on, completely covering the parts to be soldered; then heat your iron again, get a drop of solder on the end, and apply the iron to the place to be soldered. If you fail at first, try it again until you get a good tight joint. After soldering the steel needle to the top and bottom of the can, make a little tube about ⅛ of an inch in diameter of tin by hammering it over a nail and soldering the joint. Also solder up one end tight. Make two of these, then punch a small hole about as big as a pinhead near the soldered end of each one. Now punch two holes about ½ inch from the top of the can big enough to receive your small tin tubes. Place them in the

holes and solder. Be sure to face the hole out of which the steam escapes, as shown in part of drawing marked A.

Fasten a small ¼-inch block on the base with a small hole bored part way through to act as a bearing for the lower end of the rod when in position, as shown at B. Also bore a small hole to receive needle at C. A hole about ½ inch in diameter is cut in the top to put water in the can. This can be tightly corked when the engine is in operation. Get two old ink bottles of the same size; partly fill with wood alcohol; put in round cotton wicking. Fill your tin can about half full of water, remove the top brace which holds the upper part of the steel needle in place, slip over the needle and refasten, and your engine is ready to apply a match to the cotton wick. The steam escaping from the two small holes in the small tubes revolves the boiler at quite a rapid rate of speed. A small pulley can be attached to the top for transmitting power.

TIN-CAN TURBINE

In Fig. 2 we have a drawing of a turbine type of steam-engine. This is also made from tin cans without the use of wood in its construction. If you obtain a good-sized syrup can, all the movable parts can be soldered to the lid, and it will not then be necessary to punch a hole to put in water—everything being fastened on the cover the whole top can be removed. This model requires a cover from a baking-powder can, and this cover is cut similar to markings at A and bent like those in the drawing at C. These can best be bent with round-nose pliers after they are cut. Next, punch a small hole in the center; insert a hatpin, slip a burr on opposite sides and solder fast, being careful to get the hatpin centered correctly. Experience will be the best teacher in this. Out of some old piece of sheet brass or sheet iron, cut two pieces about ½ inch wide and 3 inches long; bore a small hole near the ends and in the center of both pieces, large enough to allow the hatpin to turn freely. Bend at the bottom, as in drawing at D. Now slip them over your hatpin shaft on opposite sides and solder the bottoms to the top of your can so that they will set about like the ones in the drawing at F.

Make a little tube or use a little piece of brass tubing, partly fill with hot lead, then make a little hole lengthwise in the tube about 1/16 inch in diameter. Punch hole in top of can large enough to receive the tube, then solder in position as shown at G. Cut off your hatpin just outside of braces, and solder small burrs to prevent lateral play. Fill your can about three-quarters full of water; put lid down tight, set over gas or oil stove, and when you get up steam and it begins to escape you will be surprised at the speed your

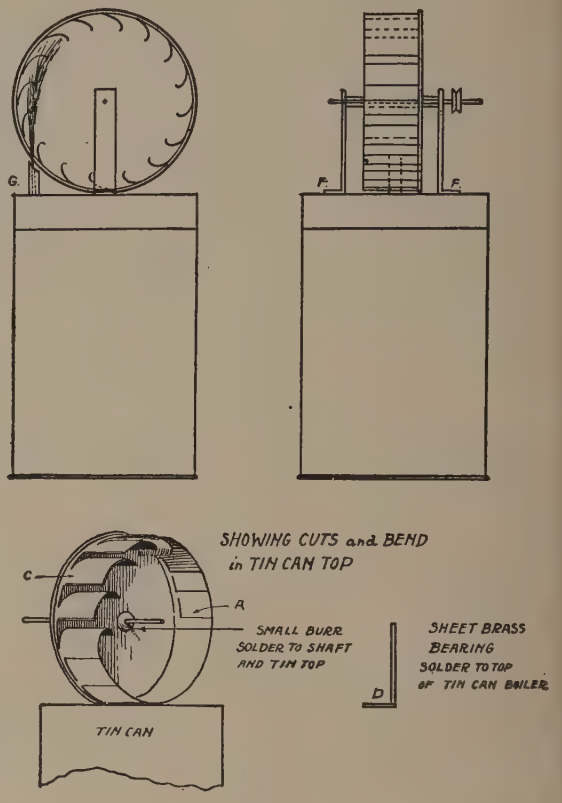


FIGURE 2

engine will turn up if you have made a careful job in the making of it. This one model sets forth the idea. A wideawake boy will be able to adapt this in a number of different ways.

CYLINDER ENGINE

Fig. 3 is a steam-engine of the walking-beam type. First we will make the wood parts. As seen from the top view of the drawing, it measures ½ inch by 4 inches by 10½ inches. It will be better to use hard wood for the parts of this engine, either oak, maple, or birch being suitable. Square up your base to size, then mark and cut a piece lengthwise out of the center at one end 1 5/16 inch wide by 6 inches long. Then square up three pieces for cleats ½ inch by 1 inch by 4 inches, and screw to the under side of the base as shown at H in drawing. It will be necessary

to cut a bevel in the center of the middle cleat to allow clearance for the wheel. Make an upright ½ inch by 1¼ inch by 6 inches, and round the top; see G. Make the walking beam out of quarter-inch wood, as per dimensions at K. It is ⅞ inch wide, 3 inches from one end, and tapers to ½ inch at both ends, which are then rounded. There is a triangular brace to help support the upright ⅞ inch thick by 3 inches on the square sides, and is fastened against the upright, as at J, with screw from the face and up through the base. There are two shaft supports made from ½-inch stock, as per dimensions at N. The top part of this is fastened with screws as shown, to firmly hold a small piece of ¼-inch tubing which acts as a bearing. The wheel is made from ⅞-inch wood 4 inches in diameter. Holes are bored through the wheel near the rim and equal distances apart, and filled with hot lead to make it heavier. This completes the wooden parts.

MAKING THE CYLINDER

Obtain a piece of ¾-inch brass tubing for a cylinder; square both ends, and solder to a piece of sheet brass 1½ inch by 1½ inch after boring holes for screws in the four corners (see F). Cut from sheet brass or copper three pieces as A, B, C, and from 3/16-inch brass rod one piece similar to D. Thread one end, flatten other, and bend as per drawing. This is the crank shaft which goes through the wheel and rests on the two bearings as shown in the upper drawing at K.

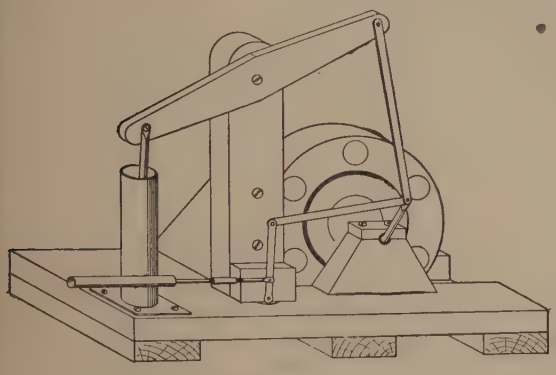


FIGURE 4

The piston head can be made by using the cylinder as a mold, and pouring in about three-quarters of an inch of hot lead, then forcing it out. Attach the piston rod so that it works freely like a hinge. The piston head should have a groove around the middle for packing as piston rings in an automobile engine, but this is not absolutely necessary if you get a nice fit otherwise.

The piston rod is made from 3/16-inch brass rod slightly flattened on both ends so that you can bore a small hole, one for a screw to fasten it to the walking beam and the other to fasten to the piston head. The drawing at L shows methods of fastening piston rod to the piston head.

The valve at M is made from a piece of ¼-inch pipe 3 inches long. A hole ⅛ inch in diameter is drilled ⅞ inch from one end, and a corresponding hole drilled ½ inch up from the base of the cylinder, and the two soldered together so that the holes meet. The valve rod is made from two pieces of ⅛-inch brass rod—one being threaded at one end with a right thread, and the other with a left thread at one end, the other end flattened slightly and drilled with about a No. 40 drill. These two pieces with the coupling O, which is a piece of 3/32-inch pipe, tapped right and left, should measure 3 inches long when joined. The valve is made from ¼-inch rod, and should be fastened to valve rod similar to the way the piston head and piston rod are fastened, so that it will work freely like a hinge. The valve shown measures about ⅜ inch long. By the use of the coupling O, you can lengthen or shorten the valve rod in adjusting and timing your valve motion. In assembling, remember all the joints are movable, and should work freely, but should not be too loose.

Escutcheon pins cut off make good rivets for fastening A, B, C, and E together.

ASSEMBLING THE PARTS

It may help you in assembling to refer to Fig. 4, which shows quite clearly how and where each part is attached. The steam may be supplied by a tea kettle with a hose connection to the intake at M.

HORIZONTAL TYPE OF STEAM-ENGINE

In Fig. 5 we have the drawings of a horizontal type of steam-engine. The base is made from hard wood 1 inch by 4 inches by 10¼ inches, and cut away on the side of one end, and also near the center a piece is cut out to make room for the flywheel; see top view of drawing L. No cleats are needed, as the thickness and narrow width will prevent warping. The cylinder is made from a piece of brass tubing ¾ inch inside diameter. The lower end is closed by partly filling with hot lead, and a ⅛-inch hole drilled to receive steam from the valve K, which has also the same size hole, which should meet the one

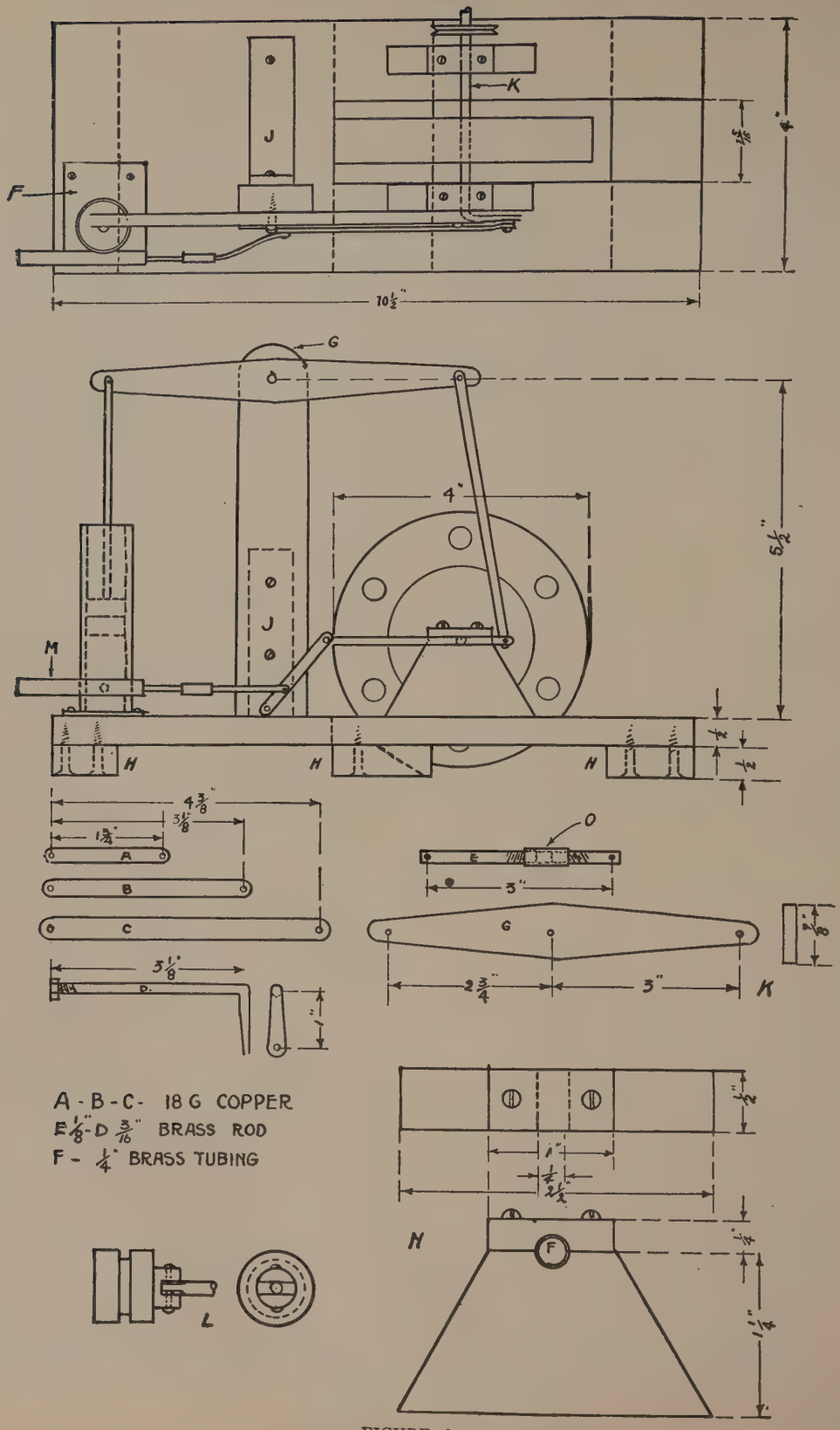

K
J
F
10½"
G
4"
M
H
H
H
4⅜"
3⅛"
1¾"
A
B
C
3⅛"
D
O
E
3"
G
2¾"
3"
K
A - B - C - 18 G COPPER
E⅛" - D 3/16" BRASS ROD
F - ¼" BRASS TUBING
L
1"
H
F

FIGURE 3

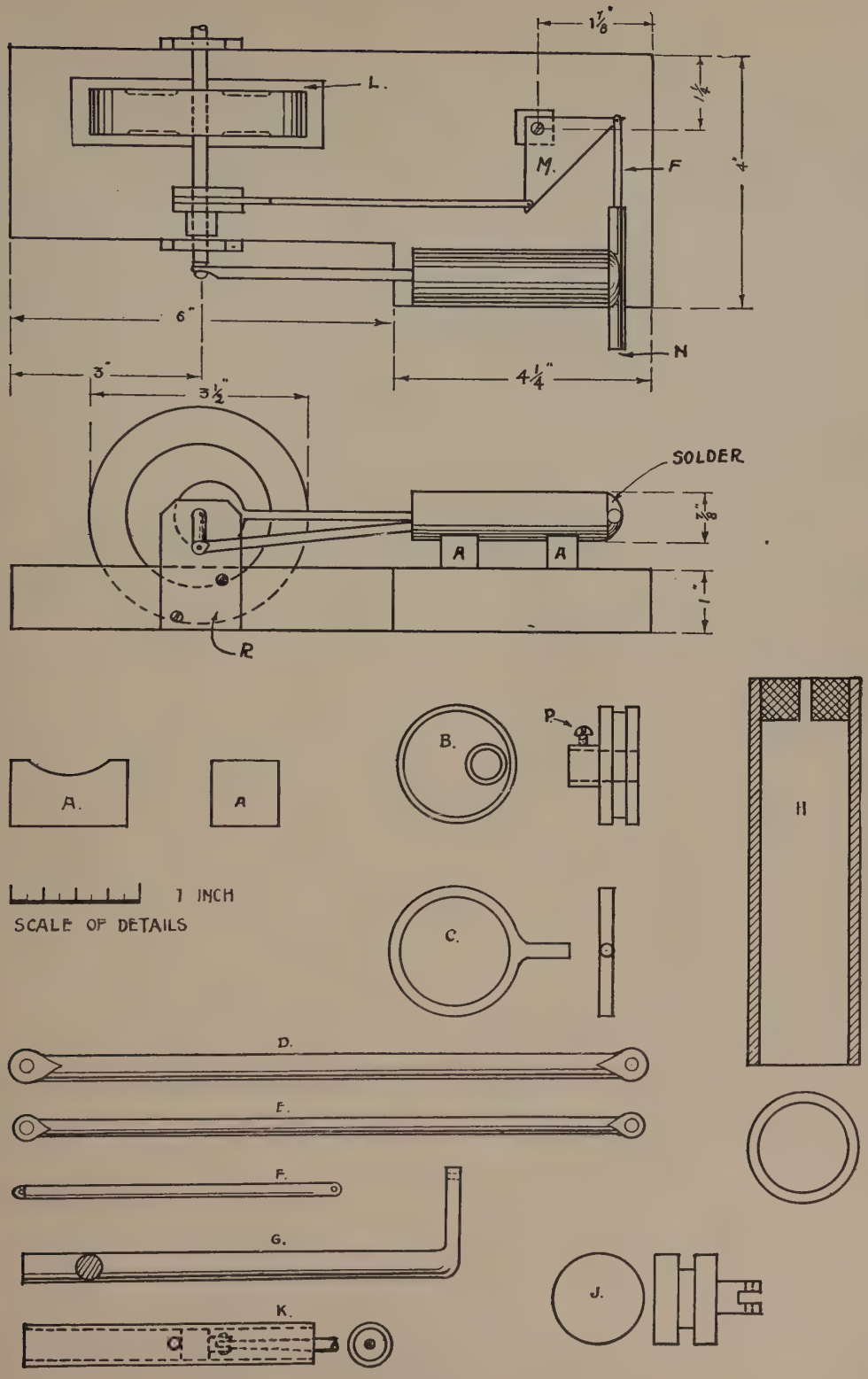

1⅞"
L.
M.
F
N
6"
3"
3½"
4¼"
SOLDER
A
A
R
A.
A
B.
P.
H
1 INCH
SCALE OF DETAILS
C.
D.
E.
F.
G.
K.
J.

FIGURE 5

in the cylinder when soldered together. Two small metal pieces are made, and a groove filed in top of each (see drawing A) to fit the cylinder and act as a bed. These are soldered fast to cylinder after first drilling hole through each to fit a screw to hold to the base. Fasten to base first, then after soldering valve to cylinder, solder cylinder to the pieces marked A. The flywheel in this engine is cast in lead.

CASTINGS

Space will not allow us to go into details, as a thorough description would be quite lengthy. Go to a nearby public library and get a book on casting and pattern making. You will have to make your pattern of wood first. Split it, as you cannot make the mold from it otherwise. Now dowel the two parts together; make yourself a flask from wood; get some molding-sand, read your reference carefully, and try to make a mold. When you have cast a good one, drill a hole in center to receive your crank shaft G, which is made from ¼-inch brass rod flattened and bent on one end, as you will note in drawing G. D is also made of ¼-inch brass rod flattened and drilled on both ends. This is your piston-rod, and is fastened so that it will work freely to your piston-head J, which is best made of iron turned to size on a machine lathe.

The eccentric B should also be made of iron on a lathe. This should have a small hole drilled in the shoulder, and tapped to receive a set screw P, so that it can be firmly fastened to crank shaft. This eccentric, as you will notice from the drawing, is hung off center, which, when fastened firmly to shaft, transmits a slight motion to B, which, when fastened to eccentric ring C, fits in the groove of the eccentric and continues the motion by way of the sheet metal triangular piece M to the valve rod F. The valve is made similar to the piston-head except in size. This is fastened to the end of F, and through its motion regulates the intake of steam which enters through hose connection at N. A small block of wood is put under one corner of M to raise it to the level of your valve and center of the crank shaft. Two bearings are made from sheet brass about ⅛ inch thick with a hole drilled near top to receive crank shaft freely, and holes near the bottom for screws to fasten to side of base.

If you should have any trouble in making your engine run, look to your valve and see if you have it adjusted so that the valve-hole is clear to receive the steam pressure at the beginning of the outward stroke, and if it is cut off at the completion of the stroke, and return of the piston head. Proper adjusting at this vital part of the engine makes all the difference between a successful and an unsuccessful engine. This can be adjusted by lengthening or shortening the stroke of your piston valve or length of the rod itself. Your valve should be in position as shown at K, at about the middle of the outward stroke.

A DERRICK

BY GRACE VINCENT

Most boys are wideawake and interested in whatever is going on around them. Wherever there are workmen you will always see a group of such boys watching intently, and asking questions.

When there is heavy lifting to be done, and materials shifted, there must be some sort of machinery to do it. A derrick is used for that purpose. Any boy with a mechanical bent will like to make the one shown in Fig. 1. This toy has the three motions used in the real thing. The mast and boom will turn, the boom and the bucket can be raised, and lowered.

The following are the necessary pieces needed for making the above. The uprights, A and B, are ½ by 1⅛ by 28 inches. These are separated, and fastened together at the top and bottom by pieces of wood ½ by 1⅛ by 1½ inch, which leaves a space for pulleys.

The boom C is two pieces, ½ by ¾ by 28 inches, separated and fastened together with pieces ½ by ¾ by 1½ inch.

The collar D is made of two pieces of ½-inch wood, 6 inches in diameter. In one of these pieces a hole is cut just large enough to take in the mast. Then the two circles are nailed together to form a pulley. Bore holes for pulleys in mast and boom with a 5/32-inch gimlet-bit. Put in pulleys, using a 3/16 by 2-inch stove bolt, as shown in the drawing. Attach the mast to the boom at the base with a small piece of No. 12 brass, as at G, with a 3/16 by 2-inch stove bolt, and screw to the collar.

The base is made of two pieces of ⅞ by 2 by 18 inches. These are placed on edge so that there will be a space large enough in the front

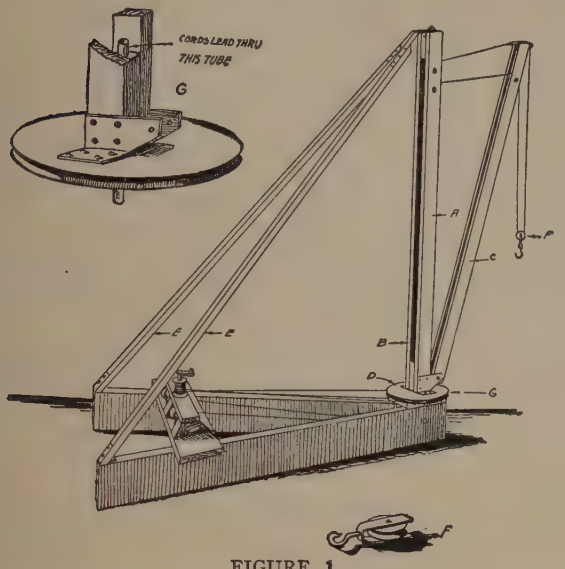


FIGURE 1

to allow an ordinary spool to turn, as Fig. 2-H. The spread at the back is about 15 inches. On the front end nail a ½-inch piece about 6 inches square, and cut off to fit the slant. Bore a hole through this piece with a 4/16-inch auger-bit, and insert a piece of tubing, which also goes through the collar into the mast at G. This allows the collar to turn. Bore two holes in the baseboards so that tubing will be just in front of them. Through these insert a dowel rod which fits tightly; put the spool through at J, and it acts as a pulley.

The braces are ⅝ by ⅝ by 35 inches (length may vary). They are fastened to the mast and base with a strip of copper screwed at the top so the mast may move easily.

Ask your mother for two basting thread spools and an ordinary one. These will be your drums. Cut three pieces of wood ⅞ by 2¼ by 3 inches. Taper like K. Put a dowel rod through your large spools, tight enough so that the spools will not revolve. Leave enough out for handles. Bore holes in your pieces with a bit one size larger than the dowels used. Put your spools in place, one each side of the ⅞-inch pieces. Cut a board to hold the spools, ½ by 6 by 15 inches, and place directly back of the mast so that the middle piece holding the spool will be in line with the mast. Screw the piece to the 6 by 15-inch board, then fasten to the base 4 inches from the back, as in Fig. 2. On top of the spools nail a piece of ½-inch wood, as long and wide as will cover spools. In the middle upright bore a ¼-inch

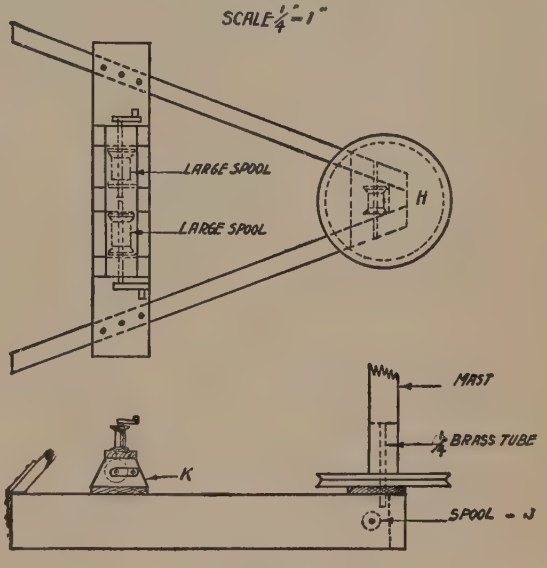


FIGURE 2

hole and insert a dowel rod. Glue tightly so spool will revolve. Make handles for each spool.

String up the derrick so that the small spool will turn the collar—one raise and lower the boom, and the other the bucket.

Any bright boy can rig up a brake to keep the spools from turning.

BOOK-HOLDERS

BY HARRIS W. MOORE

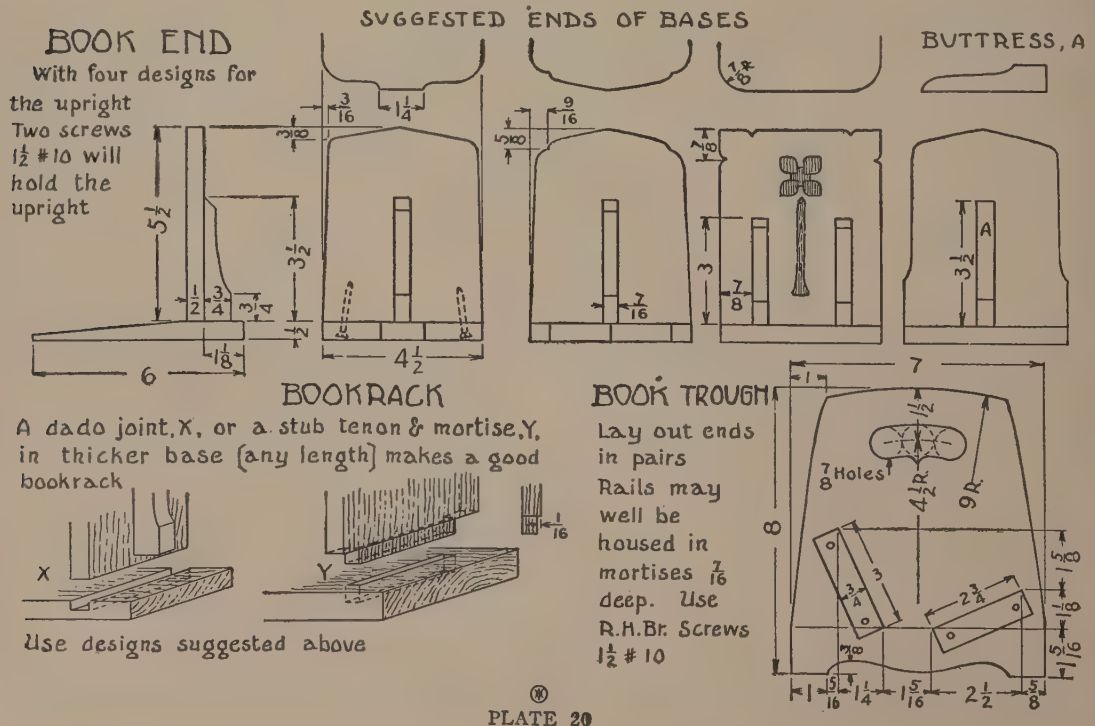
Book-ends are like captains, to make the last few hooks in the row stand upright, as they should. In some respects they are better than sliding bookracks, because, no matter how long the row of books is, one book-end at each end of the row will keep the whole row upright. Made of choice wood, well finished, and showing the marks of good workmanship, these models need no further decoration. The simple decoration suggested in the third design can be outlined with a veining tool, or a penknife, and then painted a flat, subdued tone in harmony with the stain used. This method of decoration is more successful on fine grain woods than on those of coarse grain. The stock:

Bottom, 6 by 4½ by ½ inch.
Upright, 5½ by 4½ by ½ inch.
Buttress, 3½ by ¾ by ½ inch.

Shape the upright and the buttress first, then sandpaper carefully, and glue the buttress in place. After the bottom is shaped, it can be planed ⅛ inch thick at one end by planing against the wooden strip ⅛ inch thick, which has been glued and pegged with wooden pegs to a flat board.

The simplest method of fastening the upright and bottom is suggested in the drawing, but a good workman should not be satisfied merely to screw the parts together, but rather join them as suggested in the book-rack.

Book-racks and book-troughs are nice for small sets or special collections of books. If a guest comes to tarry a few days, why not gather some good books in one of these models, and place them in his room? To make the joint in the book-rack, first finish the uprights, then hold it where it belongs on the base, and draw a scratch around it with a penknife. Test these lines with a try-square, and cut them deeper, if necessary. A well-cut line is needed to set the chisel in when the walls of the mortise are cut. To cut out the mortise, a wide chisel is used across the grain. Use a mallet to strike with; always begin chisel-


BOOK END
With four designs for the upright
Two screws 1½ #10 will hold the upright
SUGGESTED ENDS OF BASES
BUTTRESS, A
BOOKRACK
A dado joint, X, or a stub tenon & mortise, Y, in thicker base (any length) makes a good bookrack
X
Y
Use designs suggested above
BOOK TROUGH
Lay out ends in pairs
Rails may well be housed in mortises 7/16 deep. Use R.H.Br. Screws 1½ #10
7 Holes

ing a little away from the knife line and gradually work up to it. For the last chip, set the chisel in the knife line with the bevel of the chisel toward the mortise, and strike a good blow. The walls of the dado joint can be cut with a back saw, and the remaining wood pared out with a narrow chisel, held bevel side up. The ends of the bottom board should be modified by a curve or a bevel to make them look nicer. The stock for book-trough:

Two ends, 8 by 7 by ⅞ inch.
One rail, 17 by 3 by ¾ inch.
One rail, 17 by 2¾ by ¾ inch.

The rails should be prepared first, special pains being taken to plane them flat. Cross and crooked grain wood is apt to wind, or warp, as it dries; and unless the rails are "out of wind," as a workman says, the book-trough will not stand solid. To test a board for wind, lay it on a surface that is flat, or test it by squinting along the surface, or place two parallel edge stocks, as rulers, one near each end of the board, then squint across the two sticks. Plane off the high corners and test again.

When the rails are finished, the end pieces should be planed square, and the mortises laid out, and chiseled before the other parts are shaped. The dimensions at the right and at the bottom of the drawing locate one line of each mortise. After they are located, the other lines are made by tracing around the ends of the rail with a knife. When the mortises are chiseled, holes are bored near their ends for screws.

PUSHMOBILE

BY HARRIS W. MOORE

WHAT boy does not like to coast in Winter with sled, skis, or toboggan, and in Summer with roller skates, cart, or, best of all, a pushmobile! There is a bicycle tractor now on the market which will really make a vehicle like this go. The plate shows only the essential running parts, and control, and suggests the use of baby carriage wheels, since these, as a rule, are the easiest to get. A boy who can build the chassis can add the floor, seat, hood, and whatever parts he chooses, to make it look like a real automobile. If the wheels do not have rubber tires, a brake might well be added. Dimensions are not given because they depend so many times upon the size of wheels used. Pieces of 2 by 4-inch studding are suggested for the long rails and front axle blocks.

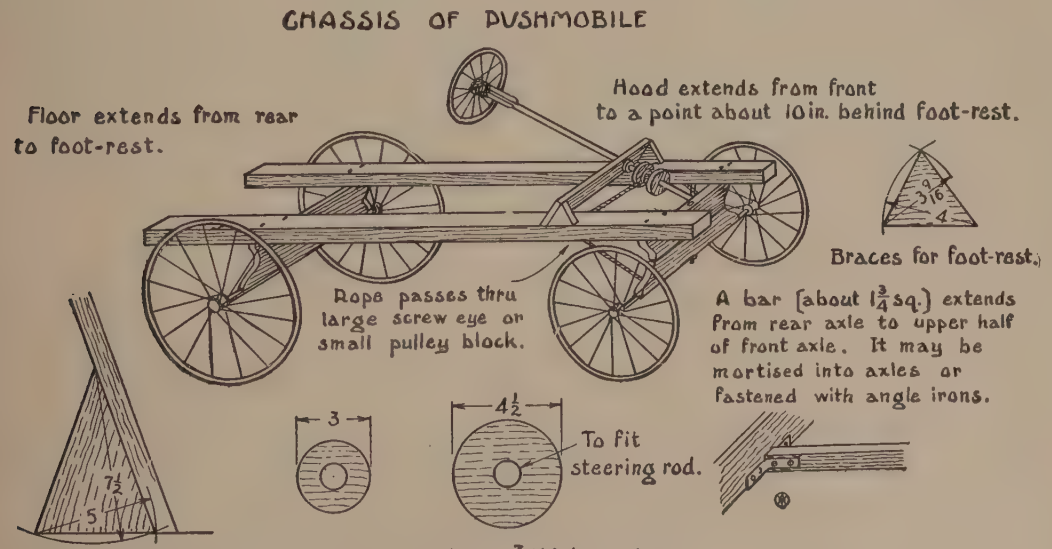

CHASSIS OF PUSHMOBILE
Floor extends from rear to foot-rest.
Hood extends from front to a point about 10 in. behind foot-rest.
Braces for foot-rest.
Rope passes thru large screw eye or small pulley block.
A bar (about 1¾ sq.) extends from rear axle to upper half of front axle. It may be mortised into axles or fastened with angle irons.
3
4½
To fit steering rod.
7½
5
Brace for seat back.
Three small wheels ⅞ thick and two large ones ½ thick glued and nailed together form the drum.

PLATE 21

though these axle blocks should be planed about 1½ inch thick. The floor should allow the front wheels to turn far enough to steer well. The lower edges of the axle blocks should extend well out to the limbs of the wheels. Make the rear axle first. Strong wood ⅞ inch thick will answer for this, if the bar and the two rails are well fastened to it. The front axle blocks should be wide enough to keep the floor level, and thick enough so that a king-bolt (½ inch diameter) will clear the iron axle. A big washer (2½ inches diameter, 9/10-inch hole) should be placed between the two parts of this axle, so that the lower part will steer easily.

A broomstick, or curtain pole, will do for the steering post; and a small carriage wheel can be used for a steering wheel, if a long screw or spike holds it to the end of the post; and then two pieces of hard wood, shaped to fit down to the limb between the spokes, and about 8 inches down the post, are screwed to the post, and the wheel lashed securely to these two sticks.

A drum the size given in the drawing makes for easy steering. It should be screwed to the post. The rope should make at least three or four turns around the drum, and it should pass from the under side of the drum outward through the screw eye, or pulley, and be fastened to a screw eye near the end of the lower axle block. This rope should be kept taut. Braided sash cord is best. It should be fastened by two staples to the drum at middle of the turn.

The steering post is placed a little to the left of the center of the chassis, to avoid the bar and the king-bolt. Its forward end enters into a hole bored in a block fastened to the upper axle block, and is held there by a collar just in front of the foot rest.

HOW TO MAKE A WHISTLE

First take a willow bough,
  Smooth and round and dark,
And cut a little ring
  Just through the outside bark.

Then tap and rap it gently
  With many a tap and pound,
To loosen up the bark,
  So it may turn round.

Slip the bark off carefully,
  So that it will not break,
And cut away the inside part,
  And then a mouthpiece make.

Now put the bark all nicely back,
  And in a single minute
Just put it to your lips,
  And blow the whistle in it.

—*From Iowa Arbor and Bird Day, Selected.*

THINGS TO MAKE AND DO

AIRPLANE MODEL

BY CHARLES M. MILLER

THE first and chief word in airplane model building is lightness. The butterfly is not much of an object, measured by avoirdupois; and the bird has a hollow frame in his little body—but they both fly beautifully.

Many boys attempt airplane models, but as a rule they plan too heavy a framework, and are much surprised when the object of their great hopes falls to the ground. Something has been learned, 'tis true; but it is hardly a fair thing, when a little instruction might have brought about very different results.

Airplane model building is quite different from what it was a few years ago. At first the aim was to build something that would go long distances, whether practical in a large machine or not; now the effort is not so much for distance, but for a reproduction of the man-carrying machines in miniature form, with self-propelling possibilities. This kind of construction has a field, as it is in line with the future building of large planes. The racers usually go backward, and are mere skimmers in comparison with the real models.

The work must be well planned from the beginning, and to get results a thoroughgoing layout is necessary, and a close following of this must be adhered to. In the present model, the frame gets much of its strength through the triangular bracing, for the fusilage (the main body framework) is triangular in shape, like the "Antoinette" monoplane, as is shown in the cross-section of framework in Fig. 3.

The elevation (Fig. 1), the plan (Fig. 2), and the front view (Fig. 3) give a general and useful conception of the design. The three main pieces of the fusilage are shown in Fig. 4. It is plotted out by dimensions and should be easy to enlarge on a flat board. By drawing a line about an inch from one edge of the board, the plotting can easily correspond to that done from the center line of Fig. 4. The inside stick is 3/16 inch square, and there should be two for the upper beams of the fusilage. To bend these satisfactorily, boil for a time in water for about 12 inches of their length. The nails are represented by the round dots. Use enough nails to prevent the sticks from bending out of place; force them to the curve, as laid out. One stick can be placed on top of the other. The outside stick, which is the lower beam or keel, is 3/16 by 1/4 inch, and is bent to the outside of the upper beams, as shown in Fig. 4.

In putting the fusilage together, first fasten the two upper beams like a ladder. It will be seen that the cross pieces (Fig. 3) are 3/16 inch square, and are notched at both ends to receive the upper beams. The lengths of the cross braces. (Plan Fig. 2) are as follows: *a*, 3 inches to the outside of beams; *b* and *f*, 2½ inches; *c*, 2 inches; *d*, 1½ inches; *e*, 1¼ inches and 1⅛ inches for tail piece, and 1½ inch for head piece. The side braces of section A, Fig. 3, are 2 15/16 inches between notches, and 3/16 inch square in cross section. All the side braces are placed on the frame so as to be just in front of the horizontal cross pieces, the nailing not then interfering. All the braces are first glued and then nailed with ½-inch brads cut in two about the middle.

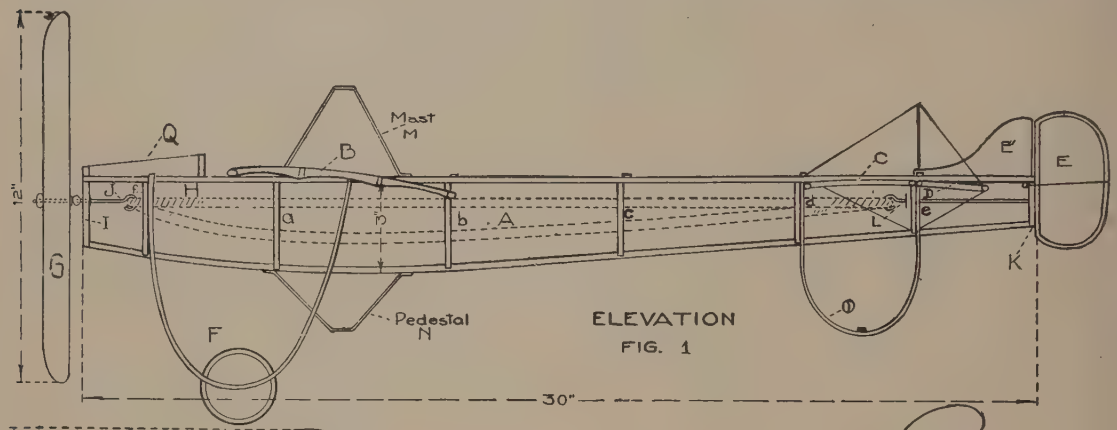
First make a hole with a small awl or drill to prevent splitting; also it is easier to start the nails. There must be some solid object for the framework to rest on when the nailing is done, and the part right under the nail must be seated, if no other part is. Sometimes the frame can be placed across the corner of a table to catch

some difficult part. Side braces at *b* are 2 13/16 inches, and 2 5/16 inches between notches; *c* is 2½ inches; *d* 1⅞ inch, and *e* 1½ inch.

The head piece (Fig. 13) can be made of solid wood or of three-ply bass. The dimensions are given, the width being 1½ inch and the height 2 inches to the under side of the upper beams. The lower beam or keel is set up into the wood. The hole for the propeller shaft is ½ inch down from the lower side of upper beams, and is in the central vertical line. The hole is made a little larger than the propeller shaft, and has pieces of tin on each side of the head piece that make the real bearings for the shaft, which does not rest on the wood at all. A piece of tin 5/16 by ⅜ inch, is large enough for this bearing plate. The hole in the tin should be just large enough to allow the propeller shaft to turn freely. The cuts for the upper beam should be a little wider at the front than at back edge, as the beams slant out for some distance on leaving head piece.

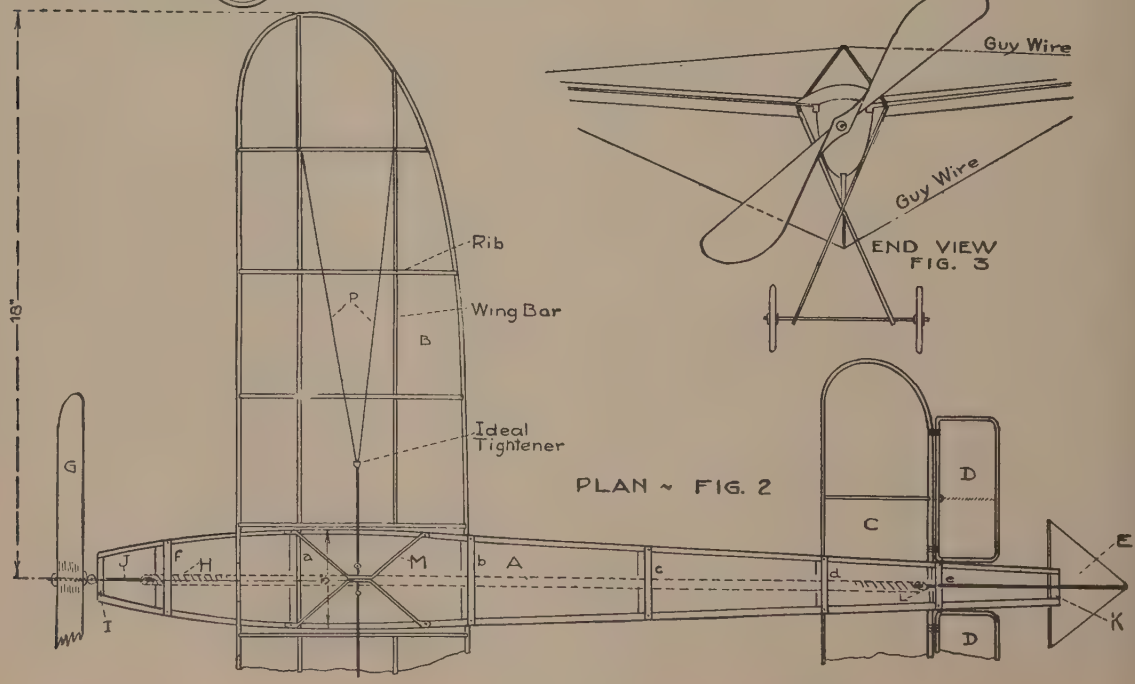
The tail piece is similar to the head, but is ¼ inch thick, and has other dimensions. The extra thickness is best on account of the twist that must be resisted from winding the rubber motor. The two holes are to receive the motor hook (Fig. 19). After the hook is in place, the end could be bent up so as not to loose out when motor is removed for any cause.

The framework of the fusilage is now com-

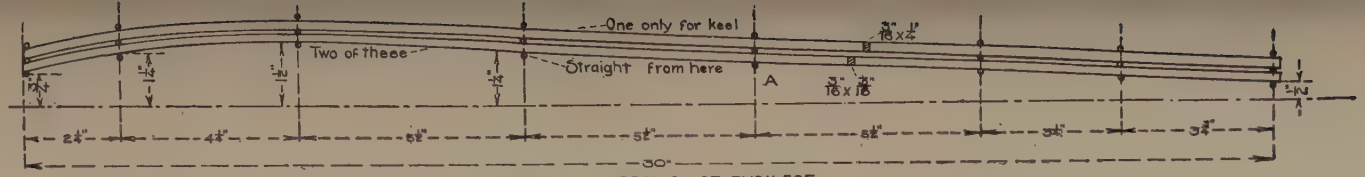


ELEVATION
FIG. 1

END VIEW
FIG. 3



PLAN ~ FIG. 2



LAYOUT FOR BEAMS OF FUSILEGE

o = 1" Brads

FIG. 4

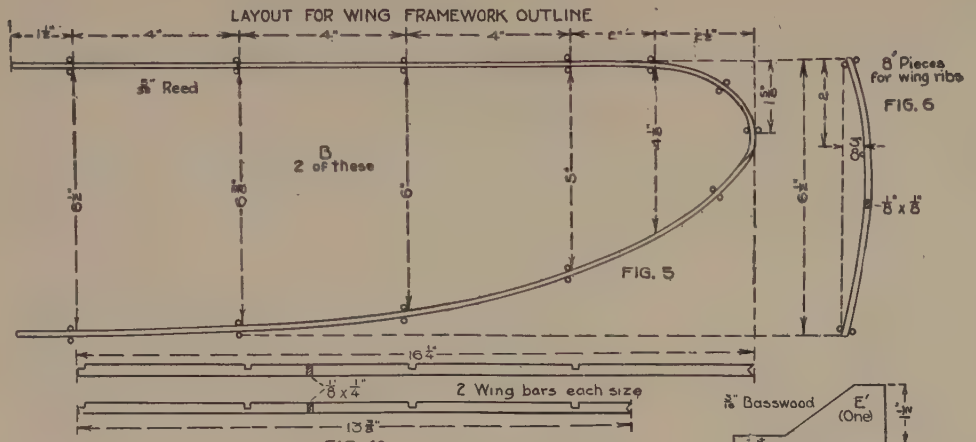
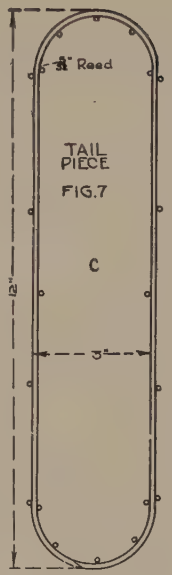
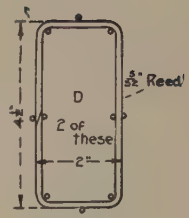


FIG. 5





ELEVATOR

FIG. 8

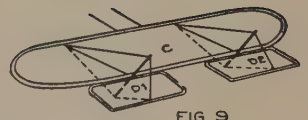
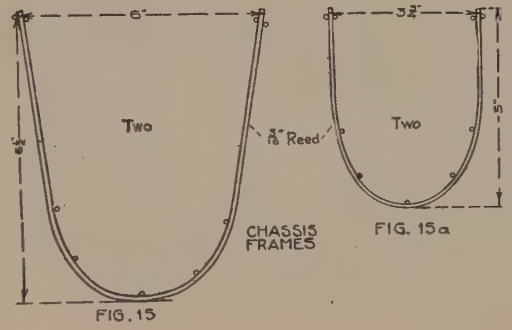


FIG. 9



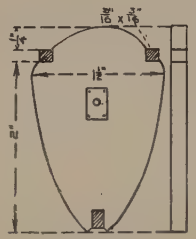
CHASSIS FRAMES

FIG. 15a

FIG. 15

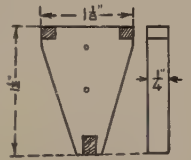
RUDDER

FIG. 12



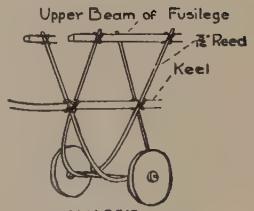
HEAD PIECE
(3 Ply Basswood)

FIG. 13



TAIL PIECE

FIG. 14



CHASSIS

FIG. 16

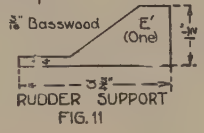


FIG. 11

FIG. 13a

ELEVATOR

FIG. 8

FIG. 9

CHASSIS FRAMES

FIG. 15a

FIG. 15

RUDDER

FIG. 12

HEAD PIECE
(3 Ply Basswood)

FIG. 13

TAIL PIECE

FIG. 14

CHASSIS

FIG. 16

FIG. 11

FIG. 13a

plete, ready for the other framework. The main wing frame is in two parts, a right and left. The outlines can be bent on one form, but one must be turned over to make it come right for the opposite side. The outline is made of 5/32-inch reed, which should be quite free from hairy fibers. The layout is definitely shown by Fig. 5.

If the reed is soaked in warm, or even cold, water for 20 to 30 minutes it will bend about the nails of the layout easily. It might be well to turn a few of the nails down to prevent warping-up while the drying is going on. Leave in the board until the other material, such as ribs and wing bars, are ready.

In Fig. 2 the ribs and wing bars are labeled. It will be seen that the wing bars do not pass beyond the last rib next to the fusilage. The ribs are 1/8 by 1/8 inch, and are bent as in Fig. 6. The highest point of camber (curvature) is 2 inches back from the edge, and is 3/8 inch from the straight line. It might seem that the ribs should be bent differently as we approach the outer ends, but the forward edges of the wings are nearly straight, and the ribs are cut off at the back end to shorten. The wing bars are not bent, but are notched to the full depth of the rib, which brings the upper surfaces on a level. The wing bars are 1/8 by 1/4 inch in cross section as seen in Fig. 10. The ends of the ribs, also the ends of the wing bars, are notched to get better seating against the reed outline piece. The ribs and wing bars have small holes drilled through the vertical section, near but not quite to the end of each, so that a small wire may pass through, which is in turn wound about the reed outline, and thus securely fastens the parts together. The ribs and wing bars can be nailed after gluing, but the support underneath must be right under the part nailed. It is surprising how strong this frame is, if care is observed in the making.

The outline pieces extend to the center of the fusilage, and are connected with the ones on the opposite side by means of little metal tubes that slip over both ends. These tubes may be made of tin rolled up, or aluminum (see forward edge on Fig. 2). Bamboo paper makes a good covering for the wings, and a better job is accomplished if the under side is covered first. Glue is spread on the underside of reed, ribs, and wing bars. A piece of bamboo paper is laid on this glue and stretched straight, so there are no wrinkles. Rub along the various pieces so as to make the paper adhere securely to the wood. Trim to the outside within about 3/16 inch of edge, put glue on outer and upper edge of outside piece and turn the 3/16-inch edge over and press down. On the upper side glue lay-on paper, trim, and glue down. After glue has set a little, paint both upper and lower surfaces with a quick-drying varnish—some use a lacquer with banana oil; but when it is done, lay the wings down on a flat board with two sticks along the edges and a weight across both, until dry. This prevents warping as the paper shrinks (see Fig. 5a).

The wings would droop at the ends if they were not supported by guy wires. These fine wires run from the last rib to the outer end, and are attached, where the rib crosses the wing bars, to a mast or truss that is projected above the fusilage over the wing. This truss framework can be made of bamboo or aluminum wire. The Ideal Aeroplane Model Company uses the aluminum wire. The mast may be seen in Fig. 1 and

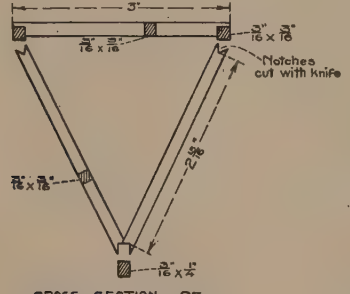


FIG. 3a

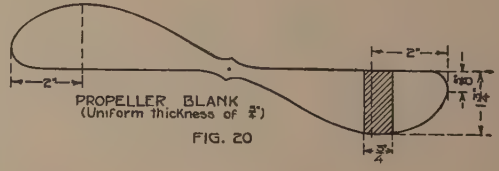


FIG. 20

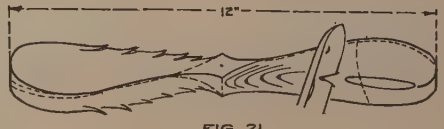


FIG. 21

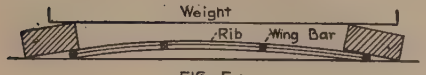


FIG. 5a

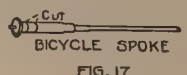


FIG. 17

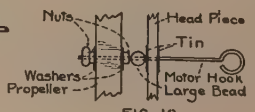


FIG. 18

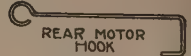


FIG. 19

Fig. 2. There are various ways of tightening, but the "Ideal" eyelet device is about the simplest, and is effective. Two wires are shown in Fig. 2, and the tightener is indicated. To tighten, move eyelet outward. The wings should tip up a little from the fusilage. To prevent them from bending up too much, a trussed frame, similar to the one on top, is placed underneath, and guy wires are run to the under side of the wings at the same location as above.

The tail piece C (Fig. 7) is made of the 5/32-inch reed, and is detailed in the drawing. It is placed under the upper beams of the fusilage, the front edge being directly under the cross piece *d* (Fig. 2), also shown in Fig. 1. This piece, when covered, varnished, and dried may be lashed to the fusilage one-half on each side.

It is well to put in a brace across the tail piece just opposite, where the adjustment D1 and D2 for the elevators is attached (see Fig. 9). The elevators are made like the other covered parts, and are hinged, each in two places, to the tail piece. There is an additional vertical small stick —split bamboo would answer—that is lashed to the inside of the frame of the elevator. The string belt passes up and around these and holds the elevators in tilted positions. These sticks must be securely fastened with glue and small wire or thread. Stripped magnet wire is a good winding medium for such work. The elevators control the ups and downs of airplane life, while the rudder steers right and left like a boat rudder.

The rudder is attached to the tail piece, but it also has an extension support above, as is shown by Figs. 1 and 11. This extension may be of wood, and is secured to center of top of tail piece and to the first cross piece preceding. The operation of the rudder is a swing from side to side, and the manipulation may be like the elevators, but may have a fixed stick just in front of the fusilage tail piece, and may be seen in Fig. 1. The string belt in this case would be secured to the outer reed or frame of rudder plane, and pass through a notch at end of the little cross stick, pass to the other end and back to rudder. The string belt would need to be kept fairly tight, but that is true of the other, too.

Now we come to the chassis frame, including the back skid. The layout for each is given in Figs. 15 and 15A, and their arrangement is shown in Fig. 16. These frames, both in the chassis and skids, are attached to the outside of the framework of the fusilage, cross underneath, and extend in a bracing manner below. The axle for the wheels act as a brace between the two extensions on the chassis, and an extra brace stick is used on the rear ones. These frames should be made of 3/16-inch reed, and where they come together should be halved so as not to crowd each other out of place. They must be securely

MODEL OF AIRPLANE

lashed and glued to the fusilage. The axle can be purchased at stores carrying airplane model supplies, or it could be made of bamboo, shaped to desired dimensions. The plain little wooden wheels are much cheaper than the metal ones, and are lighter. Little wooden washers can be glued on to keep the wheels in place. Care must be used to get the chassis straight with the fusilage, else it will pull crooked while starting, and be at a disadvantage.

A person can buy beautifully-carved propellers, but he can also make them. If one is new to the business, he might find it to his advantage to purchase a prepared propeller blank, but even this is not necessary.

In Fig. 20 is seen a propeller blank. Notice that the straight line of each blade passes through the center of the blank. It is uniform, being ¾ inch thick, 1¾ inch wide, and 12 inches long. The widest place of each blade is 2 inches back from the outer end. It is well to have proper tools to carve out the propeller, but still it can be done with a knife. Poplar is a very good material.

Fig. 21 indicates how the whittling proceeds, if carved out with a knife. First a small shaving is cut from the straight edge, and others follow, the blade being curved about as shown by the dotted line on the right blade of Fig. 21. Examine the work frequently. Strive for perfection, as it is essential to have a well-balanced propeller. As Fig. 21 lies in the drawing, it is the front side, and must go on the shaft in this relation.

Good ball-bearing propeller shafts may be purchased, and many other things; in fact, the whole machine is for sale complete and ready to fly, but a good shaft can be made from the bicycle spoke (see Fig. 17). Unscrew the long nut, and cut it with a hack-saw. With a small die, thread down the spoke a good inch: the thread is not long enough to reach through a ¾-inch propeller. Screw on the second piece of the portion cut off from the long nut and put on a washer next to it. Now slip on propeller, put on another little washer, and cut off the first small nut. Screw up tight. An extra wire can be soldered to one of the nuts, and this can be fastened to the face of the propeller, preventing any tendency to turn without permission. Inside the inner nut is a glass bead that reduces friction, and the wire extends through the head piece. The inner end of the wire, after the surplus length has been cut off, is bent into the forward motor hook.

The main wings are attached, as shown in Figs. 1 and 2. The back end of the plane rests against the side-braces of the fusilage at *b* (Figs. 1 and 2). The front edge of the planes rest on the upper beams of the fusilage. The back edge should be down about ¼ inch from the under side of the upper fusilege beams. Some may need this back edge lowered a little, others may need it raised; bu this is about the right location.

A hood can be placed over the forward end of the fusilage, and a little support can be put back to carry the rear end of the hood (see Fig. 1).

The end view shows masts, chassis, guy wires, and front view of propeller.

Again, let us remember it is worth while to make a good model, and the triangular frame is a strong, light, and practical one.

The sides of the fusilage should be covered back to *b* section, and may be covered the entire length, but it is better to leave the space between *b* and *c* open as a vent.

The rubber of the motor is 3/16 inch flat, and has 16 strands, 8 forward and 8 back—8 rounds. It is about 24 inches between hooks, and that would be the length drawn taut, but it is well to give a little sag, as it increases the number of revolutions, and will unwind to the limit, so about 35 feet would be necessary.

Insignia can be cut out and pasted on, or drawn in water colors.

The first winding should not exceed 600 revolutions. Increase the number when other experiments have been tried, such as raising elevators, lowering, etc. It will be observed that the two elevators are independent of each other, and this is right.

There is a lot of work on a model of this kind, but it is interesting, and is in line with the development of the large machines. So it is instructive, too, and a pleasant occupation indeed for those inclined to mechanics and aeronautics.

COIN AND STAMP COLLECTIONS

BY FRANK H. CHELEY

THE boy or girl who has never made a collection of anything would be as hard to find as the long sought for "missing link," for as a matter of fact, most boys and girls make many collections, especially during their school-days, outgrowing one and growing into another as the seasons and years go by; sometimes even quite successfully making two or three different ones at the same time. Collections are closely related to hobbies, and like them are sometimes quite worthless.

There are so many interesting and really worthwhile things to collect which bring us health and an increased store of useful information that it is folly to give time, space, or money to useless collections. I once knew a boy who was a very enthusiastic collector of collar-buttons. A "different" button was a source of great delight to him; but his whole lot was worthless, except as a novelty. Another boy collected tobacco tags, and still another birds' eggs and nests. These boys had not used discrimination in choosing something to collect.

Don't make the same mistake. *Collect something worth while*—something you can be proud of, and that you will wish to keep because of the splendid associations it has brought you. As in selecting a hobby, let your collection have a purpose.

It is well to remember that what is worth doing is worth doing well. This is particularly true in making collections. Be particular, orderly, and systematic. If you are going to devote considerable time, labor, and perhaps a portion of your spending money in order to obtain additional specimens for any given collection, arrange them well, and give them the protection they may need. Of course, different sorts of collections require to be kept in different ways; and it is the purpose of these little articles on collecting to make suggestions along that line as well as some others as we go.

Most collections are built up by one collector exchanging his duplicates with another. This is true, whether the collection be of stamps, coins, leaves, flowers, insects, or what not. Sometimes the exchange is made right in the neighborhood, sometimes with a collector in another city, and now and then with a collector in a far country. When I was an enthusiastic stamp collector I got many of my very best "traders" from a Korean boy with whom I was in friendly correspondence; and when I later collected cocoons I exchanged Colorado minerals with a Michigan school-teacher for Michigan cocoons.

Such transactions add greatly to the interest of any collection, and suggest an important matter. In exchanging specimens never take the slightest advantage of one who has not become as proficient a collector in your line as you. Be honest. I recall one boy who was deep in his heart ashamed of his whole excellent stamp collection because many of the best ones he had secured from younger, more inexperienced collectors by trading them a quantity of useless stuff for a prize unknown to them. Don't forget that you will be looking at your collection very often —perhaps all the rest of your life—and you do not wish it to be forever suggesting little dishonesties to you. Be enthusiastic, but absolutely "square."

Early provide a safe place for your collections. If stamps, an album made for the purpose: don't leave them all over the house for Mother to pick up after you. If rocks, simple cases that may be set away in a closet. If insects, take time to prepare the proper glass cases. If you are fortunate enough to have a room of your own, very likely that will be the logical place for them, but in any event, do not leave them scattered about where they are likely to be unintentionally destroyed, much to your disgust and chagrin.

Learn early accurately to label your specimens. It helps so much to remember them, and where you got them. If you come into possession of a specimen that you cannot name and label, look it up at once, and do not be satisfied until you know the real facts and then put them down; for after all, that is just the sort of thing that makes collecting worth while—the formation of systematic, orderly habits, coupled with the growth of keen observation and a better memory. I know a boy who has an amazing knowledge of the North American Indian, all of which he has gathered in connection with his own collection

of Indian arrow-heads and relics. Every single specimen has a story of interest; consequently his collection is of tremendous interest to all who see it and hear these little stories. As a by-product of his collection, he has become an accepted authority on the Indian life of a certain section.

A wideawake farmer boy in Kansas, Elam Bartholomew, as the result of his little collection of fungi, later became, in addition to one of that State's most scientific farmers, a national and internationally recognized authority on fungi. He has actually classified more than fifty thousand specimens. When as a boy he had learned the names of fifty wild grasses, and had collected four hundred and sixty flowering plants and classified them, he felt he had made "some collection"; but because he had not been content with just the collection itself, but had "learned all about it," he awoke one day to discover that the world wanted the information he had gathered with such painstaking care. He began to lecture in the colleges, and then to write books. His simple, well-kept collection was the doorway to great opportunities for him.

That leads me to say that probably nature offers the best field for collections. Of course, stamps, coins, photographs, and the like are worth while, but it is to nature that we turn for the possibility of the largest variety of collections. There are flowers, and leaves, and seeds to collect. There are mosses, and ferns, and galls, and fungi; there are seaweeds and shells; there are rocks, minerals, and fossils; there are specimens of wood; there are moths, butterflies, insects, and cocoons—the whole big book of nature is wide open to the collector, each such collection bringing one more and more out-of-doors to find pleasure and recreation in God's dooryard.

COIN COLLECTING

Coin collecting was more popular in the past than it is at the present time, and yet there are many thousands of coin collectors to-day. Coin collecting is intensely interesting because of history, and geography, and governments that one must familiarize himself with in order properly to judge and classify coins. Contrary to the popular notion, it need not be an expensive proposition, as there are thousands and thousands of the copper, brass, and nickel pieces of the nations of the earth that may be acquired at small cost. Of course, if one wishes to own a few odd silver and gold pieces, those may be added slowly, as the pocketbook will allow.

Do not make the fatal mistake of attempting to collect coins for the possible profit. Worth-while profits in old coins are only possible with the few rare and expensive coins. Leave such collecting as a main issue to the coin speculator, and content yourself with coins of historic and geographic interest. Many such expensive coins are of no more real interest than a like coin with a different date or without some minor technical difference. I know a boy who has accumulated, one at a time, upward of two thousand different coins with a total outlay of less than $40, invested a few cents at a time. His collection, of course, is worth many times that amount now, for here and there he has picked up, through the interest of his friends, a really rare and valuable coin.

Generally, old coins are classified in three groups: ancient coins dating from 7 B.C. to approximately 400 A.D., medieval coins dating from 400 A.D. to 1550, and modern coins dating from 1550 to the present time. It is not at all difficult to get hold of ancient Greek and Roman coins, or even specimens of the early Chinese coinage, which was first made 700 B.C.

These Chinese pieces were of brass, and were cast in the shape of an ancient knife. Later pieces of the same type were made with the blade left off, and then finally just a round-cornered brass disk with the characteristic Chinese writing stamped upon them. For many, many years Chinese cash, as it is called, has been the same, simply a round brass check with a hole in the center so it may be conveniently strung on a thong, or worn about the neck. Any boy may secure a variety of these pieces with little or no trouble.

The first coins of Greece and Rome were mere bits of metal, into which was stamped a symbol such as a god, or a sacred bird or insect. From this a perfect system of coinage was developed that rivals our own. In Rome the various families originally made their own coins, and they were usually small silver pieces bearing a poor imprint of the two-headed Janus, a crude picture of their favorite gods, or perhaps a Roman bull, or the prow of a gallery. Some of this coinage was very large and difficult to handle. This sort of coinage also later developed into a national system. The coins of Constantine's time, for instance, bore on one side the profile of himself, with the date, and the other a Roman soldier slaying a Centaur.

In East India and Siam, shells are used for coinage. In the Indian Archipelago, whales' teeth are the current money, the red teeth being worth twenty times the white. In Egypt, precious stones on which a scarabus was carved were used extensively as coin, and are found in circulation even to-day. In Sumatra, tiny cubes of beeswax of a

fixed weight were used as coin, and make an interesting addition to a coin collection. In Burma the common coinage is of lead. Phœnician coins were made of tin brought from Britain. Russia has used platinum, but like pure gold and silver it is too soft, the loss being great from daily use. Modern coins have been largely of copper, nickel, silver, and gold alloy, as to-day.

The Portugese rei is probably the coin of smallest value in the coinage of all the world, it being worth about one nineteenth part of an English penny. In Sweden, huge squares of copper often weighing three or four pounds, appropriately stamped, were issued as coins, and may be seen to-day in some of the larger collections. The ordinary coinage of Great Britain is probably the most elegantly executed and contains less alloy than any other coinage. For that reason it has been used and is now accepted nearly at its face value, as are the coins of the United States, in nearly every nation of the earth.

Medieval coins are probably among the rarest and most difficult to secure. Irish money is very rare. It consisted largely of brass rings. In Arabia, both brass and glass rings were used, but genuine specimens are now hard to obtain. European and South American coins of the smallest denominations are not rare and a large and interesting variety may be had by any boy at a trifling cost.

ROMAN COINS

There is also a very large variety of our own American money that any boy may possess. Our first national coins were made by the Virginia Company a few years after the founding of Jamestown. Before Revolutionary days the various Colonies had their mints and struck their own coins. Many of these are not rare, and notable among them is the Pine Tree Shilling. The first national coinage came in 1783, and consisted of half-cent, one-cent, and five-cent pieces in copper; ten, twenty, twenty-five, and fifty-cent pieces and dollars in silver; with two-cent pieces in bronze, three-cent pieces in nickel. Twenty-five-cent, fifty-cent, and one-dollar pieces in gold were later added. From time to time since the first American coinage, slight changes have been made in design and material.

Following is a brief list of some of the rarest of United States coins, with their approximate value. It is generally conceded that a considerable number of these are still in common circulation, and may be had by wide-awake collectors.

The rarest of the half-cents are as follows: 1793, valued at $1; 1796, valued at $10; 1831, 1836, 1840 to 1849, and 1852, valued at $4.

The rarest of the cents are as follows: 1793, with wreath, is valued at $2.50; 1793, with chain, valued at $3.50; 1793, with liberty cap, valued at

$4; 1799, valued at $25; 1804, valued at $200; 1809, valued at $1.

The rarest of the silver dollars as as follows: 1794, valued at $35; 1798, with small eagle, valued at $2; 1799, with five stars facing, valued at $2; 1804, valued at $800; 1836, valued at $5; 1838, valued at $25; 1839, valued at $15; 1851, valued at $20; 1852, valued at $25; 1854, valued at $6 1855, valued at $5; 1856, valued at $2; 1858, valued at $20.

The rarest of the silver half dollars are as follows: 1794, valued at $5; 1796, valued at $40; 1797, valued at $30; 1801, valued at $2; 1815, valued at $4; 1836, reeded, valued at $3; 1838, Orleans, valued at $5; 1852, valued at $3; 1853, no arrows, valued at $15.

The rarest of the silver quarter dollars are as follows: 1796, valued at $3; 1804, valued at $3; 1823, valued at $50; 1853, no arrows, valued at $4; 1874 proof, valued at $10; 1877 proof, valued at $2; 1878 proof, valued at $2.

The rarest of the silver dimes or ten-cent pieces are as follows: 1796, valued at $3; 1797, 16 stars, valued at $4; 1797, 13 stars, valued at $4.50; 1798, valued at $2; 1800, valued at $4; 1801 to 1804, each valued at $3; 1804, valued at $5; 1805 to 1811, each valued at 50 cents; 1811, valued at 75 cents; 1822, valued at $3; 1846, valued at $1.

The rarest of the silver half-dimes or five-cent pieces are as follows: 1794, valued at $3; 1795, valued at 75 cents; 1796 and 1797, valued at $2; 1800, valued at 75 cents; 1801, valued at $1.50; 1802, valued at $50; 1803, valued at $1.50; 1805, valued at $3; 1846, valued at $1.

The rarest of the silver three-cent pieces are as follows: 1851 to 1855, valued at 15 cents; 1855, valued at 25 cents; 1856 to 1862, valued at 15 cents; 1863 to 1873, valued at 50 cents.

Of course, if you take a pride in your collection you will add to it at every possible opportunity. Probably you will find upon inquiry that Father or Uncle, Mother or Aunt has an old bag or purse of coins put away. Persuade them to allow you to add them to your collection, and then you in turn hand them on down in the years to come to your own child.

HOW TO KEEP YOUR COINS

Keep all coins in separate envelopes, or in shallow trays or cases made for that purpose. To jumble them all together in a bag or box is to damage them severely. When put in trays, either place a number or a description at the bottom of each little division. A number is better, then a more detailed index telling about the coin may be kept in a handy book.

STAMP COLLECTING

There are undoubtedly many more stamp collectors than coin collectors, largely because stamps are very much more easily obtained and because they, generally speaking, are less expensive and are more easily cared for. A well-made collection of stamps represent an enormous amount of pains, care, and general information and are worth all they cost and more. Probably this is the most common of all collections made by boys and girls, yet a few suggestions should prove helpful, especially for the beginner. We will confine ourselves here strictly to suggestions relative to the making of a collection, and refer you to Mr. Kent Stiles' article in this volume on "What Stamp Collecting Teaches Us," for general information.

If you intend taking up stamp collecting, first of all provide yourself with a stamp album prepared especially for such purposes. You may purchase a very simple one for United States stamps only, or a standard album with designated spaces for all the common stamps of all the nations of the world. Such albums are not expensive, and add greatly to the appearance as well as value of your collection. By means of countless facsimiles, dates of issue and color, provided in the proper place in such albums, it is easy for the average boy quickly to arrange large numbers of stamps so that they are properly classified and well displayed.

In addition to an album, provide yourself with a standard catalogue. This contains quantities of general information, an accurate description of every stamp and its current price. With such information you are able to trade fairly and to work intelligently. Sometimes a number of young collectors may own a catalogue jointly, and thus reduce the cost, as a new one is usually printed every year to provide for later issues and for changes of prices.

Do not make the mistake of buying all your collection. If you do you loose half the fun. Stamps, both domestic and foreign, may be had from a great many sources. Nearly all offices of any size have a certain amount of foreign mail. They will be glad to save their foreign stamps for you, and these make excellent traders. Every bank in the land gets foreign as well as domestic stamps of large valuations. I know two boys who each week go through the waste paper bin of a certain bank and gather quantities of fine stamps for exchange or sale to other collectors.

Then there is the whole foreign population of the country receiving foreign mail every week. Make friends with such folk and request their old

stamps. Some of the very best "traders" I ever got were given me each week by a friendly Chinaman in a laundry.

Make it a practice to correspond with a few boys the world over. The Boy Scout headquarters will help you make such connections, or use your church missionary societies, or have your pastor get you into communication with the church missionary. Oh, there are hundreds of ways to get interesting stamps without buying them! Perhaps there is an old trunk in Grandma's attic. It is sure to contain stamp treasures. Even Father's old papers may contribute a few. In any event, a collection so made is far superior to a "purchased collection."

Select the best specimen of each variety you get and retain it. Trade the others. Keep your traders neatly arranged, either in a note-book or on loose sheets so you can display them without handling them too frequently. Never paste a stamp flat into your book or on trade sheets. Use the light onion skin gummed hinges that may be purchased from any stamp house at ten cents a thousand. This makes it possible to remove the stamp quickly without damaging it or the book. If you must remove stamps from old envelopes, either carefully steam them off, or soak a few moments in tepid water. As soon as the glue softens, remove the stamp and dry it face down on a blotter or cheesecloth. Hot water or long soaking fades the color, so work quickly. Never write the value *on* a stamp, always *below* it; and in cataloguing duplicates for sale or trade, be absolutely honest. If there is a doubt, give your friend the advantage.

Start by purchasing one of the general-mixture packets offered by every stamp house, and then branch out as you can. Medium priced packets are invariably a better buy than stamps from approval sheets, for you always find many that you do not have and have many good traders as a by-product. Resort to "approval sheets" only when you wish to fill a set, or get some especially desirable stamps. Bear in mind, too, that new uncanceled or especially surcharged stamps displayed on the approval sheets of many unreliable stamp firms are pure counterfeits—trash. They not only cheapen your own collection, but absorb the little money that you have to invest.

Much current news and information can be had on stamp collecting by following the stamp notes in any one of the leading boys' magazines.

WHAT STAMP COLLECTING TEACHES US

BY KENT B. STILES

WHY is philately—the technical name for stamp collecting—a fascinating hobby which engages the attention not alone of boys and girls in every land, but of the grown-ups, men and women both?

To find the true answer to this question we may examine the reasons which many leading educators have advanced to explain their written and spoken words of encouragement when the question has been brought before them as to whether it is really worth while for the boy to love his stamps.

These reasons may be found through a study of the stamps themselves. Every one of these paper postal squares, triangles and oblongs, has its interesting story—and knowledge of the events behind these stories is equivalent to knowledge of what is worth learning about many subjects, including history, geography, economics, botany, mythology, natural science, astronomy, mineralogy, biology, navigation and transportation, art and architecture, literature and religion.

If by collecting stamps, and at the same time examining into the motives of governments for printing and issuing those stamps, we may come to know *facts* of worldwide significance, of international importance, does it after all seem strange that school-teachers, and ministers, and publicists, and many other leaders, once boys or girls themselves, should approve of philately? For the hobby teaches us those *facts;* and so the collecting of stamps is recognized as one method of imparting education. And the fun of it is that the dry and technical phases of acquiring education through this method are entirely missing; when we study stamps, and read of all the stories behind them, we just naturally learn *facts* without realizing that at the same time we are storing in our minds, along with the joys and relaxation, useful information which is certain to be of benefit in many ways when we have stepped from childhood's estate across the threshold into the land where men and women live.

If my statement is correct—that behind each stamp there is a tale worth the telling because of the informative value of that tale—the very finest

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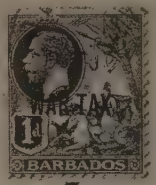

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FIGURE 1.—SWITZERLAND

Peace with a bouquet in one hand and a spray of laurel wreath in the other.

FIGURE 2.—NEW ZEALAND

Peace and the British lion walking side by side, Peace holding aloft a laurel wreath.

FIGURE 3.—BARBADOS

The surcharges on these labels explain the character of the stamps. These and many other British colonies raised funds in this way to help pay expenses in sending military and other aid to the motherland, England.

FIGURE 4.—NEW ZEALAND

The surcharges on these labels explain the character of the stamps. These and many other British colonies raised funds in this way to help pay expenses in sending military and other aid to the motherland, England.

FIGURE 5.—BRITISH OCCUPATION STAMP

One of series used in German East Africa after that colony had been seized.

FIGURE 6.—HEDJAZ (ARABIA)

When Arabia threw off the Turkish yoke, during the World War, a series of special stamps was issued, one of which is shown herewith. Various Arabic inscriptions may be translated into "Holy Mecca," "Hedjaz Post," and "1334," the date representing the lunar year after the prophet Mohammed fled from Mecca to Medina. Religious symbols of Arabia abound throughout the stamps of this series.

FIGURE 7.—JAPAN

Dove of Peace alighting on the branch of a cherry tree.

FIGURE 8.—SWEDEN

This neutral country was forced, through economic conditions, to raise postal rates. Pending the printing of new denominations, existing ones were overprinted with figures of the required values. One of these provisionals is shown herewith.

FIGURE 9.—FRANCE

Here is one of the series of charity stamps which France issued during the war. This sold for 25 plus 15 centimes, or 40 centimes. The extra fifteen centimes went into a fund to aid the orphans of soldiers killed during the war.

FIGURE 10.—PALESTINE: THE HOLY LAND

When British military forces entered the Holy Land one of the first things they did was to establish postal communication with the outside world. This stamp is one of the series issued for that purpose. The letters E. E. F. signify "Egyptian Expeditionary Force," as it was the Egyptian troops who took control of Palestine. Subsequently each stamp of this series was overprinted "Palestine," in Arabic, English, and Hebrew—all three languages appearing on every label; and this later series commemorated the withdrawal of British supervision of a military character.

FIGURE 11.—DOMINICAN REPUBLIC

This is a provisional stamp. The Dominican Republic was neutral during the World War; but before the war, her stamps were printed in Berlin. When the Allies gained control of the sea, German-made stamps were cut off from the Dominican Republic, which was as a result obliged to issue provisionals. These included earlier issues of this island republic overprinted 1915, 1916, 1917, 1919, and 1920. (None was so overprinted for 1918.)

FIGURE 12.—SCHLESWIG

A plebiscite, or "will of the people," stamp. The stamps of this series were in use in Schleswig while the population voted as to whether it preferred union with Germany or with Denmark. The northern zone favored Denmark, and subsequent sets were issued in northern Schleswig and Denmark to signify this choice. The southern zone preferred Germany.

FIGURE 13.—AIRPLANE STAMP OF THE FRENCH COLONY, TUNIS

This stamp sold for 65 centimes, and prepaid postage on an ordinary letter transported by air. The extra 30 centimes helped to defray the Government's cost of operating this airpost.

FIGURE 14.—AIRPLANE STAMP ISSUED BY GERMANY

10 pfennig, orange.

FIGURE 15.—GERMANY

Occupation of Russian Poland, early in the World War.

FIGURE 16.—GERMANY

Occupation of Belgium, early in the World War.

FIGURE 17.—GERMANY

Stamp of the first series issued by the German Republic after the overthrow of William Hohenzollern. Inscription means "German National Assembly."

FIGURE 18.—BELGIUM

This stamp was issued in commemoration of Liége, which suffered cruelly at the hands of the Germans during the World War.

FIGURE 19.—BELGIUM

This is an occupation stamp which Belgium put into use in former German territory awarded to Belgium by the Treaty of Versailles.

FIGURE 20.—JUGO-SLAVIA

The new-born nation breaking the chain of bondage in the sunlight of freedom.

FIGURE 21.—LATVIA

Three grains of wheat (agriculture) and the rising sun.

FIGURE 22.—FIUME

FIGURE 23.—CZECHO-SLOVAKIA

Showing one of the cathedrals blessed by the rising sun.

way I know of to back up my assertion is to tell briefly some of those stories. I am going to assume that I am seated in the bright light of a blazing log fire, and that you are gathered round me; I have my album open on my knees, and you are listening while I talk.

I think that perhaps the easiest way to drive home exactly what I mean about stamps and *facts* is to go back only a few years—back to the World War, which was responsible for more interesting varieties of stamps, perhaps than any other period in history. When you have learned why many governments, both belligerents and neutrals, issued thousands of different kinds of postal adhesives, you will, I am certain, comprehend why literally millions of boys of all nationalities have apparently gone crazy about stamps.

Ever since philately became a hobby, some seventy or eighty years ago, the postage stamp and the flags of nations have been closely associated. From this circumstance there has arisen a saying that "Philately follows the flag"; and this expression was illustrated time and again during the World War, as I shall now show you.

When Germany conducted her military invasion of Belgium, in 1914, the German administrative authorities took with them great stocks of German postage stamps; upon these stamps the Germans overprinted the word *Belgien* (meaning "Belgium"), and these labels they compelled the Belgian people to use on letters. These are known as "occupation" stamps; and the Germans similarly issued "occupation" sets in Russian Poland, Lithuania, etc.

In the course of the war, Great Britain and France also circulated "occupation" labels—upon taking over Germany's colonial possessions on island and mainland in Australasia, Africa, and elsewhere.

There was precedent for this practice. In previous international conflicts it had been done. During the war between Spain and the United States, our Uncle Sam issued "occupation" stamps for use in Cuba, Porto Rico, the Philippines, and Guam.

The German "occupation" stamps for Belgium were but the first of a long list of such sets distributed by numerous stamp-issuing governments throughout the years of the war; and even after the Armistice was signed, in 1918, there were "occupation" labels issued in many parts of Europe—in Thrace, Syria, Batum, Hungary, Ukrania, Cilicia, Mesopotamia, Azerbaijan, and other lands where political and military conditions were unstable.

By studying these "occupation" stamps, past and present, we may learn of history, and geography, and politics of years gone by, and of the time which we call our own.

And of these former and present periods we may learn also by knowing about stamps which fall within the "commemorative" class. The United States issued stamps, in 1893, to commemorate events in the life of Christopher Columbus and the discovery of America; in 1898, to commemorate historical happenings west of the Mississippi in the earlier days of the nation's expansion; in 1904, to commemorate the Louisiana Purchase; in 1907, to commemorate the coming of John Smith to Jamestown; in 1909, in memory of Abraham Lincoln; in 1912, to commemorate Balboa and the discovery of San Francisco Bay; in 1920, a series to mark the passing of three hundred years since the landing of the Pilgrims on the shores of Massachusetts; in 1923, in memory of President Harding who had died in office; in 1924, to commemorate the settlements made by the Huguenot-Walloons in 1624; in 1927, to honor Colonel Lindbergh who made the first non-stop airplane crossing of the Atlantic.

So "commemoratives" tell us of American history and progress, and many other nations have similarly told their beloved stories through the instrumentality of the postage stamp. As striking examples of these "commemoratives" we have Denmark's issue to honor the re-acquisition of northern Schleswig, for many years under German rule; and Sweden's issue in memory of the establishing of the Swedish postal system three centuries ago.

It is common practice for nations to make their peoples familiar with the portraits of past and present executive rulers by presenting those portraits upon stamps—and here again we learn *facts* of importance. Uncle Sam has done this repeatedly—although it is his custom never so to honor a President while he is living. When King Albert of Belgium recently visited Brazil, the Brazilian Government commemorated his arrival by issuing a stamp containing the portraits of both the Belgian monarch and the living Brazilian President, Pessoa.

The rise of new governments and the disintegration and fall of others are to be noted through the study of stamps. Witness the collapse of the government which once was royal Russia over which Emporer Nicholas Romanoff ruled. Out of this broad expanse of territory, stretching from ocean to ocean, were carved many new stamp-issuing governments—among them, Poland, Lithuania, Ukrania, Georgia, Latvia, Esthonia, Ingermanland, Finland. In regions more southerly

SORTING OVER A NEW PACKET OF STAMPS

arose Jugo-Slavia and Czecho-Slovakia. Little Montenegro disappeared.

Hundreds upon hundreds of new stamps have appeared to serve as records of all these and other momentous events—and back down through many years of history the great political developments in all sections of the world may similarly be associated with philately.

You know about the Treaty of Versailles—the great document containing the record of the agreements reached by the nations which fought in the World War. In that document it was set forth that many small populations were to be permitted to vote as to their political preferences—each people to decide to what nation it wished to be joined. So it was arranged that plebiscites should be held. A plebiscite is a vote by the people. And so, during the holding of the plebiscites in Upper Silesia, Eastern Silesia, Memel, Allenstein, Marienwerder, Schleswig, and other sections of territory claimed by one Power or another, special stamps were issued for use by the people while the balloting was in progress. So long as philately continues as a hobby, these stamps will have a special significance; and the boys and girls who collect and study them will come to learn some of the important features of the Treaty of Versailles.

Biblical names so familiar to us all are associated to-day with stamps; and the boy who knows his stamps and knows them well is apt to know his Bible just a little bit better than the non-collector. The Holy Land, Palestine, arose out of the World War as a stamp-issuing government. Syria, Arabia, Jerusalem, Egypt—these and many other lands mentioned in the Old and New Testaments—are of interests to philatelists.

Let us turn now to economics. We learn that out of the pockets of collectors came many dollars which were used to finance the carrying on of the World War. The many new issues were, of course, constantly in demand by philatelists. British colonies throughout the world—to name a few, Canada, Jamaica, Gibraltar, Antigua, Bahamas, British Honduras, Bermuda, Ceylon, Dominica, Malta, Montserrat, St. Lucia, New Zealand, Fiji—came to the aid of the mother country, England, by overprinting *War* or *War Stamp* upon their locally-issued current adhesives. These sold for extra amounts, and collectors the world over scrambled for copies, and hundreds of thousands of them were sold in return for which the colonies did not have to give postal service with its accompanying expense.

That is why the governments of England, France, Italy and other nations, the United States

included, decreed that collectors in those countries should not be allowed to purchase the uncanceled stamps of enemy countries—Germany, Austria, Turkey, Bulgaria, Hungary, Bosnia, and Herzegovina. Thus were the enemy governments cut off from a profitable source of revenue which had reached them in the years before the war. It was proper that Americans should not give up their pennies for enemy stamps when those pennies would help defray expenses of the nations making war on Uncle Sam.

To help finance these war expenses, many governments temporarily increased their postal rates. For example, shortly after the United States entered the conflict, it began to cost us three cents to defray postage on an ordinary letter. Also, owing to the scarcity of oceanic cargo space—space needed for troops and supplies moving to Europe—American shippers found that their commodities going abroad were moving slowly, and this delay cost the shippers money and time. Thus the shippers began sending freight by first-class mail—and large units of commodities require stamps of high denominations. Thus there came a necessity for such denominations—and Uncle Sam issued $2 and $5 stamps to meet this demand by shippers.

Neutrals also increased postal rates to help pay war expenses, notwithstanding that they were not at war. Switzerland mobilized her troops in readiness, fearful of invasion by the Germans. Denmark did likewise. All this cost money—and through the medium of the postage stamp, just as in the United States, the people were taxed.

The increase, in the United States, to three cents for an ordinary letter brought sharply home to the Government and the people that Uncle Sam knew little about dye-making. The demand for two-cent stamps, of course, fell off, and the Government had to turn out extra millions of three-cent ones. The war had cut off the importation of the high-quality German dyes, which had hitherto been employed for stamp-coloring at Washington. So Uncle Sam had to purchase American-made dyes—and numerous were the shades of violet and purple in which our three-cent stamp appeared while he was experimenting! Similarly there appeared many different color varieties of our other denominations.

The postal authorities found, also, that so many three-cent stamps were required to meet the new demand, that the steel plates were wearing out faster than they could be supplied—for steel was needed for manufacturing guns and other war equipment. So Uncle Sam temporarily gave up the steel-plate method of producing his stamps—and, instead, turned to the camera process.

All these interesting stories the collectors of war stamps learned one by one. Do you suppose that, had they not been interested in philately, they would have known all these *facts?*

The value of the airplane as a means of transporting mail was taken advantage of by governments during the war. Italy was the pioneer. There was congestion on land, owing to the necessity of moving soldiers, ammunition, and supplies—and mail channels were choked and letters were delayed in transmission, even important official mail. So, in 1917, between Turin and Rome the "flying machine" was utilized for mail-carrying. And on the Mediterranean, Austrian submarines were torpedoing Italian mail vessels. So Italy brought the hydro-airplane into use and transported mail between Palermo and Naples.

In the United States, too, there was delay in the forwarding of letters of importance in official, business, and commercial circles. So Yankee air-posts were established. First, the charge was twenty-four cents for an ordinary letter; later it was sixteen, subsequently six, and later no additional charge was made. Then for a while the air service was discontinued, but in 1924 it was resumed and special stamps in three denominations, eight, sixteen, and twenty-four cents, were issued to be added to the regular amount for ordinary mail; the country was divided into three zones and the fee was eight cents for each zone through which the letter passed.

Identified with the airplane to-day are stamps issued, to prepay postage on letters carried through this channel, in countries which include Czecho-Slovakia, Switzerland, Tunis, Colombian Republic, Esthonia, Hungary, Japan, Sweden, Spain, French Congo, Italy, and the United States.

Are not *facts* relative to the progress of the adaptation of the airplane to commercial and business uses worth knowing? Philately is disclosing these *facts* to those who study their stamps!

The record is without end. Story on story may be related. Stamp after stamp is being issued, at the rate of several thousand varieties in a year's time. Our blazing log fire is dying down. Let us close the album. But to-morrow—and the next day, and the day after—let us open it and turn the pages and study the stamps. The hobby is certain to become more and more fascinating—*and more worth while to the boys and girls who would know things* WORTH *knowing!*

THE CAMERA

SUCCESS WITH A CAMERA

BY C. H. CLAUDY

THE essential steps in the making of a photograph are eight in number. The lens must be focused upon the subject; the image thus formed in the little dark chamber which is the camera must be allowed to rest on the sensitive plate, or film, for the proper length of time (which is called "exposure"); the "exposed" plate, or film, must be submitted, first, to the action of certain chemicals which "develop" the image formed by the "exposure," and then to other chemicals which "fix" that developed image so that it is permanent; the washed and dried result, called a "negative," must then be placed over sensitive-to-light paper, which is in turn submitted to the action of light; the sensitive paper must be treated with chemicals, either to "develop," or "tone," or in some cases directly to "fix" the image on the paper, which, when it is washed and dried, becomes a photographic print.

Making a photograph, then, may be likened to traveling a road which has a great many narrow and difficult places upon it, at any one of which a misstep can be made. A single misstep and the traveler is off the road for the rest of that trip. He may bring up somewhere, but it won't be in the City of Good Pictures. A single mistake in any of the operations listed above, and he cannot possibly produce a good picture. If his lens has not been well focused, his picture will be blurred, regardless of how accurately he has managed the rest of the operations. If the "exposure" is either too great or too small, the resulting negative will be less good than it might be, and the print will suffer correspondingly. If development is too much or too little, too fast or too slow, the negative will be thick, or thin, or fogged, or lacking in contrast, or possessing too much contrast, all of which defects will show in the finished print. If the print is given too much light, it will be heavy and dark; if too little light, it will be thin, weak, and light.

In addition to these mechanical and chemical opportunities to go wrong, there are numbers of other chances to make a mistake in producing photographs. Thus, one may perform every operation perfectly, and still have a result in which a monument or building leans backward. One may be a skilled photographer but never produce pretty pictures, if one does not understand a little of the elementary principles of art. A photograph made from too high, too low, too near, too far a viewpoint may be perfect from the exposure, development and printing standpoints, and yet anything but attractive because misproportioned, too large, too small, or distorted.

All of which might seem to indicate that making good pictures is hard. It isn't. There is nothing hard about figuring compound interest: it is merely a slow, tedious operation. But if a little mistake is made anywhere, the result is sure to be wrong. So with photography. It is a somewhat slow, anything but tedious operation, in which one error, no matter how small, is compounded with every succeeding operation, and spoils the result. But, as with the process of figuring compound interest, all it needs is reasonable care not to make the mistake, to get a perfect result.

It would be obviously impossible to compress the whole art of photography in a story the length of this. But some of the more common pitfalls for the beginner can be indicated and illustrated. To do this it must be assumed that the reader knows which is the business end of a camera, and understands the simple and elementary prin-

ciples of photography, namely, that a lens forms an image of the object in front of it, upon the sensitive material in the camera behind it, only when it is a definite distance from that sensitive material—a distance depending in the first place on the way the lens was made; and in the second, on the distance the camera is from the object; that light is admitted through this lens for small intervals of time by a mechanism known as a shutter, which light alters the nature of the chemicals on the plate or film so that the "developer" blackens those parts exposed to light, in proportion as that exposure was short or long; that another chemical dissolves all unused chemicals from the film, thus "fixing" the image, and that "printing" is a similar operation, with the "negative" instead of a lens and shutter controlling the amount of light on the paper, as was the case in the first place.

Let us begin at the beginning and consider the mistakes which can be made without going further than focusing the lens and holding the camera.

Exposures range in length from the thousandth part of a second, on very elaborate instruments, to any length of time, even up to days. The average small hand instrument has a shutter which does not go faster than one-hundredth of a second. Most such shutters have a device to vary this "time of exposure," and can give a fiftieth, a twenty-fifth, a tenth, a fifth or a half of a second.

It is possible, but not probable, that you can hold your camera still for a longer interval than a tenth of a second. It is a good rule not to try exposures of greater length than that short time, unless the camera is supported on a box, tripod, table, fence, or other firm foundation, because if the camera moves during "exposure," you "take" several overlapping pictures at once, with a confused result.

A camera produces a rectilinear (right line) image of a rectilinear object (building, monument, fence, etc.) only when its focal plane (the plate or film) is perpendicular. If you hold your camera so that it points up, or points down, the rectilinear object will in the resulting picture seem to lean backward, or lean forward. There is no easy cure for this distortion, although it is possible, by a special process of enlarging, to straighten such crooked lines—a process, however, which is for the expert only. For the average photographer, the remedy for leaning-tower-of-Pisa pictures is to try again, and hold the camera level.

A camera may be held level, but tilted from side to side. This results in a print in which the horizon runs up hill to right or left. But the cure here is simple and easy; the print is simply trimmed until the one line in nature which is always level, is also level in the print.

A lens is made of a certain "focal length," an awe-inspiring term which simply means that when the lens is focused upon a distant object, the distance between its center and the plate or film is so many inches. The lens on the average small postal-card-size camera has a lens the focal length of which is in the neighborhood of five or six inches.

When a picture is to be taken of a near-by object, the lens must be pushed further from the plate or film than its focal length. How much it must be pushed forward, is determined in one of two ways. Some cameras possess little "focusing scales," reading in feet. The operator is supposed to set the pointer on the scale at the number of feet he is distant from the object to be pictured. Other cameras have a ground glass at the rear, which can be examined under a cloth (which excludes the surrounding light) and the image formed by the lens watched. It is then a simple matter to move the lens until the image is sharp, and clear.

Most beginners use hand cameras. Most hand cameras (except the very smallest) have focusing scales. Therefore, to make sure of your focus learn to judge with reasonable accuracy distances of six, eight, ten, fifteen, twenty-five, fifty, and a hundred feet. A half hour a day for a week spent judging distance, and measuring it afterward to see the error, will make all the difference between good and poor pictures later on. It is not necessary to judge greater distances than one hundred feet, for small lenses focus clearly all objects beyond a hundred feet distance when the lens is focused "on infinity," as the expert calls the hundred-foot mark.

There are very small cameras to be had which have lenses of such small focal length that their "infinity focus," instead of being one hundred feet, is ten feet or even less. Such cameras make no demands of the operator that he focus, and they are, by just so much, easier to use than larger instruments. The bigger the hand camera, the longer the focal length of the lens, and the greater the accuracy of distance-judgment required.

Exposure is the great stumbling block for the beginner. He has nothing on which to base a judgment. In general, let it be remembered that as between any two exposures, the longer is

almost invariably the best. When in doubt, choose the longer exposure. Under-exposure is fatal; over-exposure, while it does not make as good photographs as normal exposure, is far less inimical to perfection than under-exposure.

There are three ways of finding out what exposure should be given: Experience, a book, or a meter. There are little books of "exposure tables" which list various exposures for various subjects. Exposure depends on a great many factors—time of year, time of day, brightness of light, color of object, distance of object, direction of light; so that only experience, a book, or a meter (described in a moment) can answer accurately the question, "How much time shall I give?" These little books are well worth their small price, and are as easy to use as a dictionary. If, for instance, one is picturing a landscape, at noon, in May, in bright sunshine, one looks under "May" and finds "landscapes," and under landscapes "noon," and under noon "bright sky," and then follows down the column to "stop number," after which one finds "exposure."

"Stop number" refers to the little mechanism which varies the size of the opening in the lens. These "stops" have a definite relation to each other, each usually being half the area (not the diameter) of the next one. The average lens has a stop called "Universal System 4," when it is wide open. The next stop is U. S. 8, which is just half the size of U. S. 4. So if an exposure was right for U. S. 4 at one-hundredth of a second, at U. S. 8 it would have to be doubled, becoming one-fiftieth of a second; at U. S. 16, that would have to be doubled, becoming one twenty-fifth of a second, and so on. "Stops" are useful, both in grading exposures and to increase sharpness in a picture, for the smaller the "stop" the less accurately need focusing be done, and the sharper is the resulting picture. But as the smaller the stop, the greater the exposure, only large stops are normally used in making hand-held snap shots.

The exposure meter is a small instrument which actually measures the strength of the light by tinting a piece of sensitive paper to a certain color. The time required for this to reach a standard tint, a part of the meter, is the "light factor," which is easily translated into the proper exposure by means of tables which are a part of the instrument. A book of tables is a little easier to use than the instrument, at first, but is less accurate, since requiring more judgment on the user's part. Of course, any one can tell whether or not it is May or 2 o'clock in the afternoon, or whether one is picturing a distant landscape or a pig under a gate, but he must judge the light by his eye in the use of tables, and has a definite factor when using the meter.

It may be well to consider for a moment just what over and under-exposure do for the resulting negative. Modern sensitive material has a certain "latitude" which permits of some variation in the exposure without materially affecting the result. Thus, if the very best possible exposure for a given subject is one-tenth of a second, one could give either one-twentieth or one-fifth, and still get a fair negative. But neither would be quite as good as the right exposure. They would not be so good because the greater exposure would tend to flatten the contrasts in the subject, and the less exposure would tend to make them steeper; a greater difference between "highest height light" and "deepest shadow." It is the aim of perfect photography to have the "scale" of the photograph—that is, the gradations of dark to light—as nearly as possible like those of nature.

It must never be forgotten that while we are translating colors into monotone in making a photograph, colors have a brightness value as well as a color value. Thus, red has the greatest visual brightness. We can see a splotch of red farther than any other color. Yellow has a greater visual brightness than green, and green than violet. But these visual luminosities are not photographic. Red has the least photographic brightness, and blue and violet the greatest. Hence our scale is sufficiently likely to be inaccurate from the nature of the case, and further to tamper with its accuracy with poor exposure is to court failure at the outset.

An over-exposed negative appears thick and heavy, and prints slowly and with difficulty. An under-exposed negative is thin, and has no details in the shadows (the transparent parts). Neither makes a good print. Both can be made worse by improper development.

Development of a normal exposure should be carried on to that point where the highest high light is "through" to the other side of the film, and the deepest shadow details are well "out." But if the same development be given to an over-exposure, the shadow details are "out" long before the highest high light has attained its greatest thickness. Hence, a normally developed over-exposure is thin and flat. To make it approximate normal the greater development is often resorted to, producing the normally thick over-exposed negative. Exactly the reverse is the case with the under-exposed film. Normal development produces dense high lights, and transparent

detailless shadows, resulting in great contrast. In an effort to remedy this difficulty, many underdevelop the under-exposure, which certainly reduces contrast, but also reduces detail, with the result that a few weak high lights print in the midst of black masses of shadow, and we have nothing worth looking at as a result. To overdevelop an under-exposure is to get a "soot and whitewash" effect—nothing but blacks and whites, and no middle or detail tones.

Let it be chronicled, in passing, that he is a wise beginner who makes his development automatic, and uses a tank, with a fixed solution of known strength and known temperature, developing for known time. He who does so will get better results in the long run than even the skilled "hand developer," and will obtain far, far better results than his brother beginner who does his developing by rule of thumb.

Exactly the same reasoning which applies to correct exposure and development in the case of negatives is to be used when considering prints.

Before elaborating on this, a word as to kind of prints. The commonest paper is what is known as "D. O. P.," cryptic letters which stand for "Developing Out Paper," in distinction from "P. O. P.," or "Printing Out Paper." Printing out paper prints the image so that it can be seen as it is printed. The familiar "blue print paper," simplest of all of them, is an example. Developing out paper, on the contrary, prints a "latent image," which cannot be seen until it is developed. There are many kinds of both varieties. He is a wise beginner who sticks to simple kinds of both until he learns. Thus, platinum, among the most beautiful of papers, and carbon, among the most flexible, are both simple enough for the expert, but their use is full of pitfalls for the tyro. A simple albumen paper, blue print paper, or "plain" (home-made silver paper), among the P. O. P., and the familiar bromide or velox, among the D. O. P. papers can be mastered easily.

But do not think that because they are simple, they can be handled without some knowledge. If all photography were automatic, and left no room for skill, it would be a poor sport. D. O. P. paper, which is printed by gas or electric light, can be over or under-exposed, just as can a film, but has this charming difference: when a print is made, and "flashes up" in the developing bath, suddenly and blackly, we know at once, "too much exposure." Remembering how far we had the printing frame from the light, and how much time we gave, we cut that time in half, and try again, and again, and again, until we learn the proper exposure. Most D. O. P. papers develop fully, with normal exposure, in from twenty seconds to a minute.

D. O. P. paper comes in many surfaces, and two grades. These grades are useful in helping correct inaccuracies of negative making, a "hard" grade being used to increase contrasts when a weak, flat negative is to be printed, and a "soft" grade for brilliant, normal, or contrasty negatives. For extremely hard negatives a sun print (platinum or albumen), or a bromide paper, will give a softer result, but that is taking us into the realm of expert photography before we have learned its rudiments.

Before leaving this most elementary consideration of the simple fundamentals of photography, a caution should be given, and well memorized. One cannot do good work in photography without the utmost cleanliness in operations. Cleanliness means chemical cleanliness, not merely clean

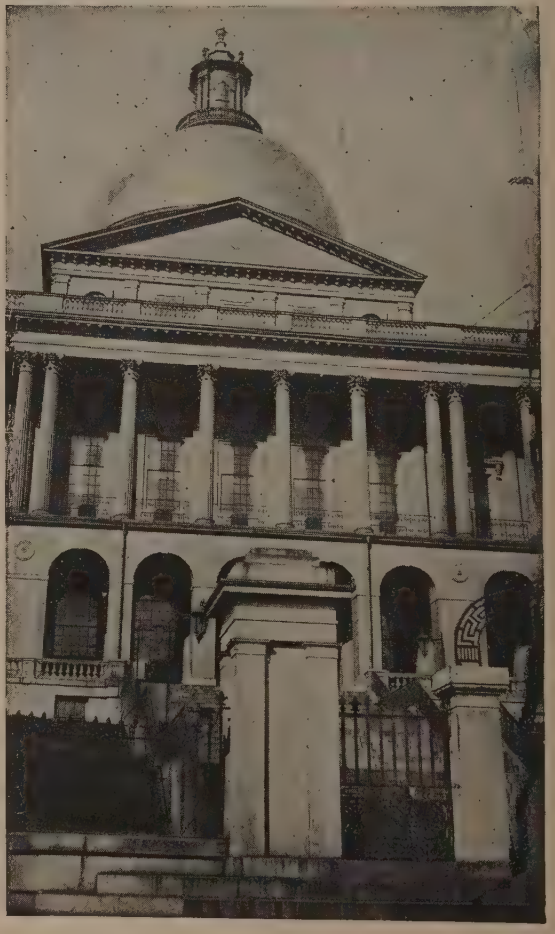


FIGURE 1

hands. It means a well-washed utensil before said utensil is used again; it means fingers which never pass from fixing bath to developing bath without a good rinse; it means fingers which never touch the sensitive surface of paper or film (leaving a little smear of perspiration which ruins the print). Of ten thousand photographic failures, all but one of them can be laid to the operator. He who blames the material is ignorant. Splotches and marks on the negative, stains and curious white marks on the print, are all referable to lack of cleanliness in the photographic sense, and almost never to poorly-made paper or film.

Let us now examine some photographs illustrating some common mistakes, and see what the remedies are. There is here no thought that this part of this story is a complete exposition of all photographic errors. They are but the more usual ones.

FIGURE 2

Fig. 1 is a photograph of a part of the historic State House in Boston. But, as those who have seen this building know, it does not taper to a point, nor do its pillars lean inward and backward. This is an example of the ill effects of going too close to a building, raising the lens of the camera, and pointing it upward in an endeavor to "get it all in." The remedy is one to be taken "before the fact": don't hold the instrument otherwise than level.

Errors in perspective are made not only by misholding the instrument. Choice of point of view has something to do with it. In Fig. 2 the operator stepped too close to his subject. He knew enough to use a "small stop" in his lens, so that both the near and the far end of the bronze are in focus, but he did not reflect that so great a difference in the proportion of the two sides of the monument would be the result of standing so close. This photograph illustrates what is known as "violent perspective": a horse never lived who was so much bigger in front than in the rear as this one; and the slightest examination of the actual monument reveals that its two sides are equal in size; not as here, very large and very small. Of course, in any perspective view, the nearer of two similar objects is bound to appear the larger, but when that appearance is magnified to the extent here shown, the eye rejects the whole as unnatural.

FIGURE 3

Fig. 3 illustrates two mistakes, one of which may be rectified if the print be trimmed according to the lines drawn upon it. When this photograph was made, the photographer held his camera crooked from right to left, not up and down. His horizon line runs uphill. We may correct this by trimming, as the lines indicate, but only at the sacrifice of size.

The second mistake here made was the choice of the wrong time of day for that particular scene, or the wrong side of the street. The pho-

FIGURE 4

tograph has been made almost directly "against the sun," so that the machine and the men leaning against it are silhouetted against the light, and have almost no detail. This effect is sometimes very pretty, and is the way in which "sunset" pictures are most often made. But for ordinary street scenes it is a mistake. Have the light shining on the thing to be photographed, or at right angles to a line drawn between the center of your view and the camera. Rarely should exposures be made when the sun is shining directly into the lens. Moreover, although the photographer has here been fortunate, sunlight shining directly into the lens often produces what the expert knows as "flare," or "ghost," which shows as a spectral-like band of light, streaking across the picture. It is caused by internal reflections of light from the inside surfaces of the lenses.

It is not, indeed, at all necessary to have direct sunlight to make a good photograph; a cloudy or overcast day often gives a quiet, reflective mood to a picture which is very pleasing. In Fig. 4 is such a result, a practically flawless piece of photography, although illustrating a common mistake in art knowledge. Here there is clear detail in the deepest shadow (the lichen in the tree at the left), and the highest highlights (the lighter parts of the water and the snow-covered cottage roof, and the sky) are none of them blank white paper. This print is full of soft gray tones—just the sort of tones one sees on an overcast day in early Spring.

But artistically the picture is a mess. It is like a checkerboard. It is divided into three parts up and down by the trees, and three parts lengthwise by near-bank, river, and further bank. The eye does not know where to go, what to look at first. Horizontal lines lead the attention to right and left, upright lines lead it up and

FIGURE 5

down: all of which could have so easily been avoided had the artist (?) been content to wander up or down the bank a little way, so that his horizontal lines might possess some perspective.

To illustrate this the more clearly, look at Fig. 5, a beautiful example of photography, and consider how the principal line of the picture—the crest of the snow bank—winds its way into the picture to the right, turns, and comes out again to the left at the top. Had the photographer squared himself off before this snow bank, as the other camera user did before his river bank, there would be no such interest in the second example as there actually is. Also note, that while the light is falling practically toward the camera, the shadows have been kept so light by perfect exposure and development, that they are full of detail; they look, not like black areas of darkness, as in Fig. 3, but like what they are, shadows on the snow.

A very common error on the part of the new photographer is to believe that what is pleasing to the eye will be pretty to the camera, and that what is lovely in nature must be beautiful in a picture. This is by no means always true. It is easily possible to get too much in a picture.

FIGURE 6

The simple view is almost invariably the most interesting. Consider Figs. 6 and 7. Fig. 6 is a view of the Great Falls of the Potomac, a lovely spot, with river and gorge, and rock, and the green of trees, and the sparkle of tumbling water. Yet this photograph is much more a map than a picture. It would be excellent for a guide book, to show the size of the water power; but as something to frame, and put on the wall, it is a failure. Had the photographer confined his attention to just the one little fall at the left, and crept closer

FIGURE 7

to it, and made it bulk large in his picture, he would, from the pictorial standpoint, have done much better.

Let no one misunderstand or think that all inclusive views are anathema. They have their place and their sphere, but that place and sphere is seldom the one of beauty, or even less often the one of interest. This may be the more plain if Fig. 7 is examined. Here is the simplest of photographic compositions—a single spreading tree, and through it, in the distance, a house. There is literally nothing else pictured, yet the whole is interesting, because the interest is focused, brought to a point—it is impossible to keep from looking at that house, and to look where you must is the same as being interested, for what we must look at touches the imagination.

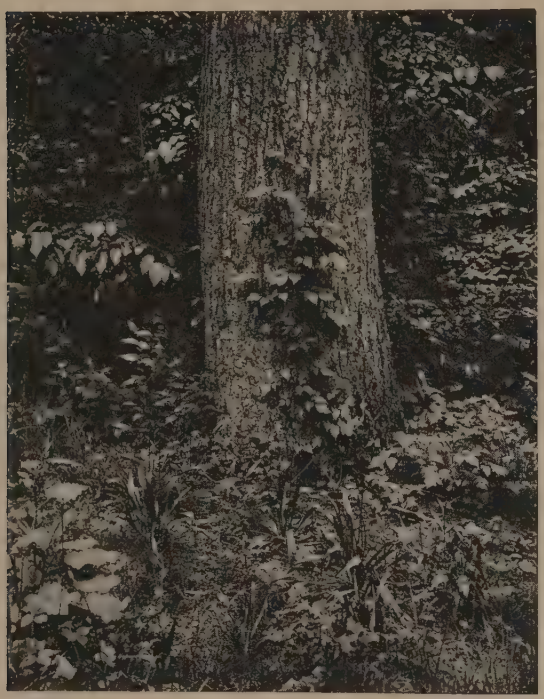


FIGURE 8

Do not make the mistake of thinking that simplicity means beauty and interest merely because it is simple. There must be contrast, perspective, depth, if interest is to be aroused. To make this the plainer, look at Figs. 8 and 9. Fig. 8 is a photograph of a single tree trunk. It is good photographically, and perhaps to a botanist might be interesting. But as a picture it is nothing—yet it is simple. The picture has no depth, no feelng, no perspective, nothing which arouses the imagination.

But Fig. 9, while only tree trunks, is quite different. Here we are going somewhere. The lines of the path lead us in, in, deeper and deeper into the wood. There is a mistiness to the air which is charmingly portrayed by the ever lightening tones as the eye goes forward. We have a starting point in the dark tree in the foreground, but there is no end to our vista, which just softly fades away. Yet this, and the previous picture, are both simple; both—tree trunks!

It may be of interest to look at an example of under and over-exposure. It should be noted here that all these photographs, reproduced as they must be by the half-tone process, are not quite as were the originals—the harsh contrasts of the under-exposure will be a little softened, the lack of contrast of the over-exposed will be accentuated by the printing.

Fig. 10 is decided under-exposure. The distant part of the view is sufficiently exposed, but the near foreground has had almost none at all. Nature does not produce tree trunks which are a midnight black. Grass is not Stygian. The triangle of darkness sticking into the picture at the top right may be a crooked barn door, a tree, or the bow of an army truck, for all the beholder can tell from its color, shape, or detail. There is an old, old rule of photography which says, "Expose for the shadows, and the highlights will take care of themselves." Had this been done here, this print could not be used as a peg on which to hang criticisms of its maker's knowledge of photography.

Fig. 11 is "flat, stale, and unprofitable." It has no contrast anywhere. The trees in both foreground and background are one dead level of tonality, which is unnatural. The sky is lifeless. Yet a close examination shows that there is detail in the heaviest shadows, which at once places the trouble as too much exposure.

This negative could yield a vastly better print by being used with a "hard" paper. But no possible "doctoring" which Fig. 10 could receive could improve it. You cannot print on the paper what is n't in the negative. If the shadows in the negative are clear film, no paper, hard or soft, can make those clear spaces print the detail they do not possess. It is for this reason that of the two evils, over-exposure is less than under, and why, in the early paragraphs of this story, it was advised that of two exposures in question, choose the longer.

Two more common examples and this little discourse must come to an end. In Fig. 12 is

FIGURE 9—AUTUMN .

seen the result of over-development. The exposure was probably correct, as there are shadow details visible. But the contrasts are harsh. The sunlight has given everything the appearance of being covered with snow, and steam from the engine, sunlit black iron on the boiler top, and logs are alike white.

Fig. 13 is a normal exposure much underdeveloped. There is plenty of detail, showing

FIGURE 10

FIGURE 11

FIGURE 12

the exposure was sufficient, but no contrast. House, wood, earth, trees, man's face, clothes, are almost the same in tonality. This, like the over-exposure, could be improved by printing on a hard paper, if a harder paper than the paper already used were available.

A word of caution in closing. Photographic materials are not in themselves expensive, and the pleasure from their proper use is great out of all proportions to their cost. But they do cost something. Common sense as well as policies of conservation dictate that we should try to get the most we can from the materials we buy. To that end, don't try to make pictures you don't know how to make. Mere aimless "snapping the shutter," "guessing at the exposure," "hoping the pointer is set right," will, of course, in the long run occasionally produce a good result. So will any one hit the bull's-eye once if he shoot a thousand shots in the general direction of a target; but it is n't shooting.

FIGURE 13

The answer is found in a little reading of instruction books, a little trying to understand the simple, elementary principles, a little effort to grasp the "why" of photography as well as the "how."

Photography stands with a great basket heaped high with the pleasant fruits of success, waiting the chance to drop it in your lap, if you shall woo her with but an ordinary understanding of her simplest facts; and her fruit is pleasant to the taste of him who likes success.

AN EXAMPLE OF PORTRAIT PHOTOGRAPHY

PRINCIPLES AND THEORIES OF MECHANICS

MECHANICAL MOVEMENTS MADE CLEAR

BY H. C. STILLMAN

Illustrations by the Author

We often hear someone remark we are living in the most wonderful age the world has ever seen. There is no doubt about the truth of the statement, but that does not necessarily mean the human mind is more wonderful or capable to-day than in the days of old. Our mechanics, our scientists, our chemists—all have the discoveries of the men before them to stand on. So our products are the accumulations of centuries and ought to be wonderful, otherwise we would be going backward instead of forward.

In order to get pretty well to the bottom of things, let us go away back down the line to the time of old Archimedes, the Mathematician of Greece, who said that he could move the world if he had a lever long enough and a place to stand. No doubt he could have, and since he didn't get either the lever or the foothold for such a job, he didn't move the world as a mass; but he did a great deal toward helping to move big loads *on* the earth and in developing our knowledge of mechanics. He used the same laws of mechanics that we do to-day, only the forms used were crude.

Archimedes proved that there are six forms of applying mechanical power, or force, and these can really be reduced to two, because four of them are modifications of the others. The two most generally used methods of applying power in the mechanical world are the *lever* and the *inclined plane*. The lever subdivides into levers, pulleys, and the wheel and axle. The inclined plane has two other members of its family, the wedge and the screw. In the following pages there are a number of illustrations of each of these mechanical powers.

Levers are divided into three classes: first, second, and third. When you are working around the summer camp or around home, prying out big stones or other objects, you are using the first mechanical power. A lever of the first class has the fulcrum, or balancing point, between the ends, as in Figure 1, the power on the long end, and the weight on the short end. The difference between the three classes of levers is in the relative positions of the fulcrum, the weight, and the point at which the power is applied. If you examine Figures 1, 2, and 3, this will be clear. In order to figure how much force in pounds must be exerted, on the power arm of a lever of the first class in order to lift a weight of 200 pounds, it

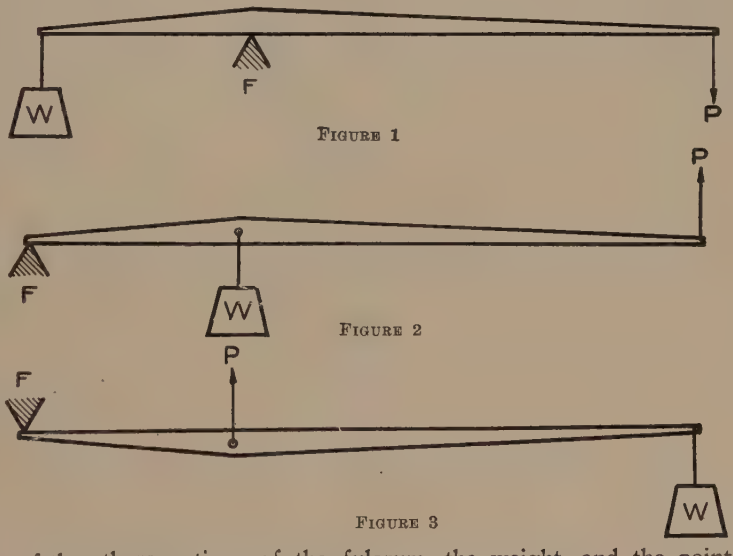


Figure 1

Figure 2

Figure 3

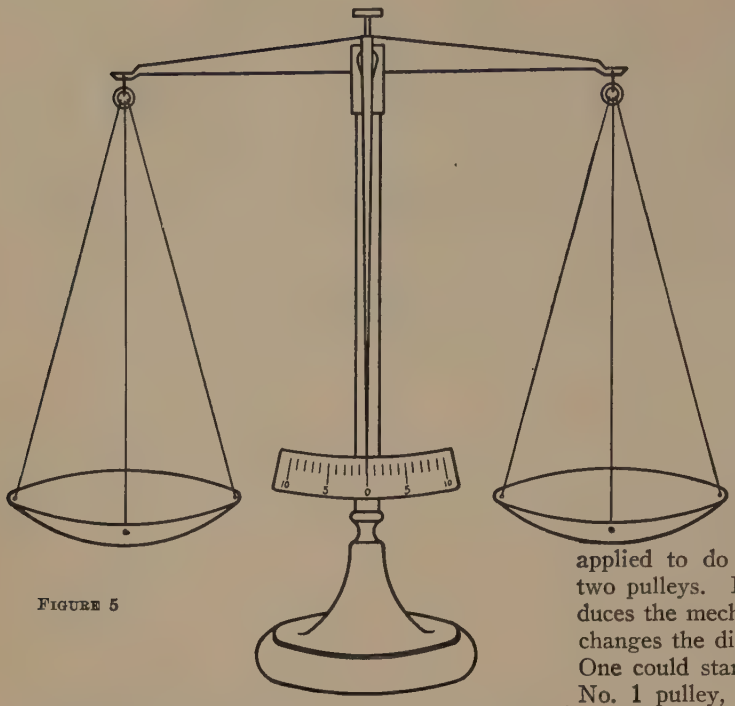


FIGURE 5

is only necessary to state it as an inverse proportion, P:W :: Wt. Arm: Power Arm. Or, if the fulcrum (f) is 2 feet from the weight and 8 feet from the power, then P:200 :: 2:8. Therefore, remembering that the product of the means (or two inside factors) equals the product of the extremes (two outside factors, we have $P = \frac{200 \times 2}{8} = \frac{400}{8} = 50$ lbs.

Applying the same problem to the second class levers, we would have the weight between the fulcrum and the power at a distance of 2 feet from the fulcrum. This would place the power 10 feet from the fulcrum, and the statement would be P:W :: Wt. Arm: Power Arm, or P: 200 :: 2:10. Then $P = \frac{200 \times 2}{10} = \frac{400}{10} = 40$ lbs.

So we find that a lever of a certain length is more powerful with the fulcrum at the end than between the two ends.

Levers of the third class, where the power is applied between the weight and fulcrum, are sometimes more convenient to use than the first or second class. There is no mechanical advantage in this lever, because the power must be greater than the weight. You can see from Figure 3 that if the power is applied from the fulcrum, the lift will be more than the amount of weight, or P: 200 :: 10:2. Then $P = \frac{200 \times 10}{2} = \frac{2000}{2} =$ 1000 lbs.

Before going to other forms of mechanical power let us look at some of the modern applications of lever power.

Figure 4 represents the gear shift lever of a modern automobile, a lever of the first class.

Figure 5 is a scale, or set of balances.

The second mechanical power is the pulley. This, of course, is widely found in the mechanical field because of its many forms. The simplest form is the one which merely changes direction of force, but it has no mechanical advantage. Figure 6 illustrates this case. By *mechanical advantage* we mean the number of times the weight moved is greater than the amount of force applied to do the work. In Figure 7 we have two pulleys. Pulley No. 1 is the one which produces the mechanical advantage, while No. 2 only changes the direction of the application of power. One could stand on the beam and, by using only No. 1 pulley, with an upward pull on the rope, accomplish the same result with the same amount of work, but pulley No. 2 changes the direction so that the worker may stand on the ground and use his own weight to aid in pulling on the rope until the two pulleys meet.

The mechanical advantage of any set of pulleys or tackle blocks is represented by the number of strands

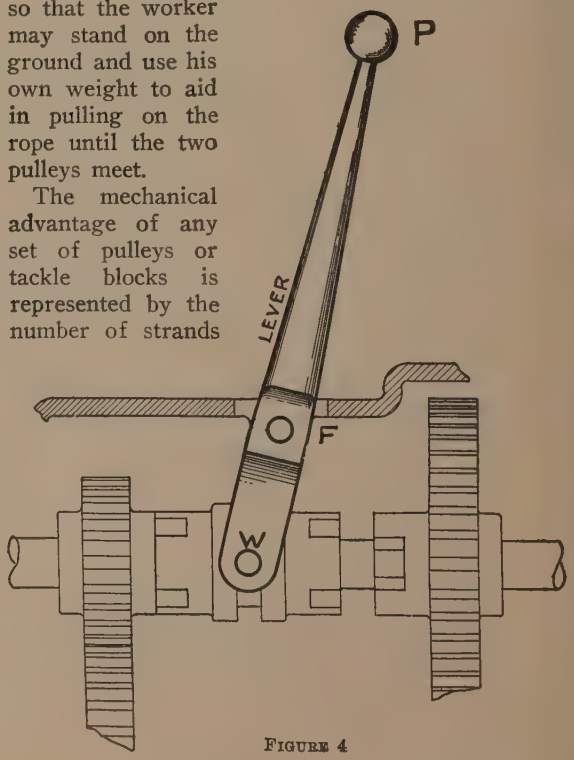


FIGURE 4

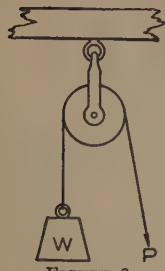


FIGURE 6

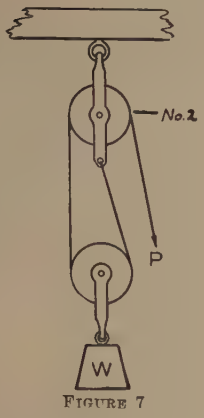


FIGURE 7

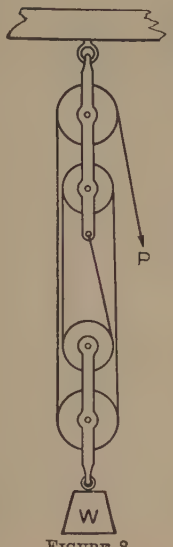


FIGURE 8

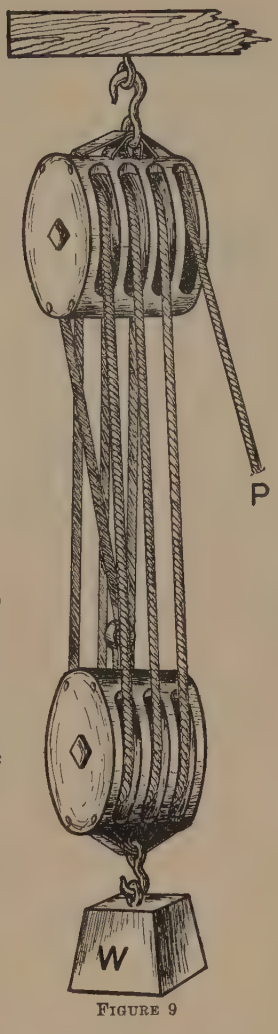


FIGURE 9

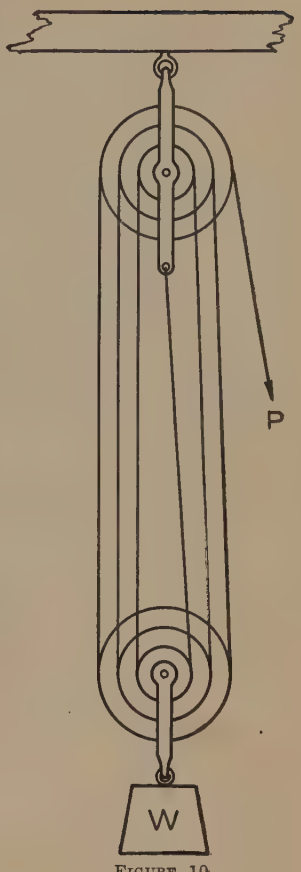


FIGURE 10

of rope running between the two blocks, or sets of pulleys, and engaging the movable block, exclusive of the one receiving the application of power, or, more simply, by the number of strands of rope used in the combination which helps to support the weight. Thus, it will be easily seen that in Figure 7 the advantage is 2. In Figure 8 the advantage is 4, while in Figure 9, which is a common form of compound tackle blocks, the advantage is 7. In other words, a man weighing 150 pounds, by using all his weight, could balance a load of 1050 pounds. He could really *lift* half a ton.

Another form of compound pulley block, seen in Figure 10, is found in machine shops, where a chain is used instead of a rope.

Figure 11 is another form of pulley and is found on your "bike." Here power is sacrificed to speed, because the driving sprocket wheel is larger than the driven one.

The third mechanical power is known as the *wheel* and *axle*. Here the principle of the lever is again involved. If we have a wheel or crank (Figure 12), 24 inches in diameter on the end of a 4-inch shaft suspended in the curbing of an open well, the amount of power applied on the end of the crank will be only one-sixth of the weight of the bucket and water drawn up. The formula for finding the power required to raise a given weight would be P:W :: diameter of axle: diameter of wheel. You will readily see that it makes no difference whether the axle is moved by a wheel or by a crank. The mechanical result is the same.

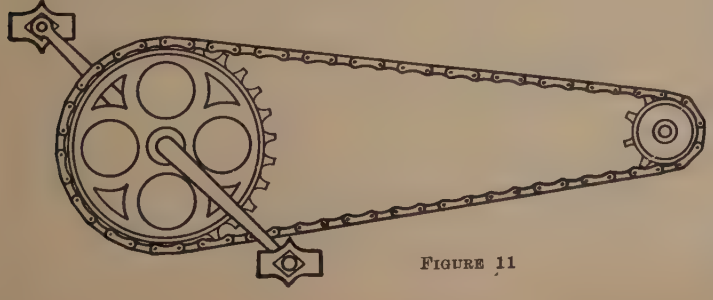


FIGURE 11

The windlass and capstan (Figure 13) is a familiar illustration of this third mechanical contrivance. It raises the anchor of a ship, the ratchet at the base holding the capstan at any desired point, and the lever at the top giving the mechanical advantage for lifting the anchor.

Another application of wheel and axle is found in the various forms of water wheels. Figure 14 shows a simple undershot water wheel, such

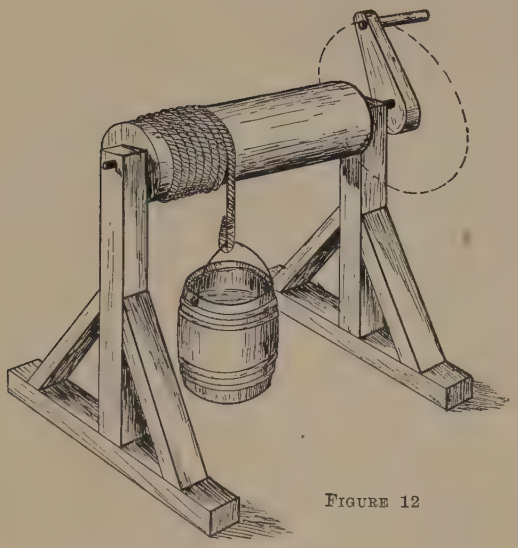


FIGURE 12

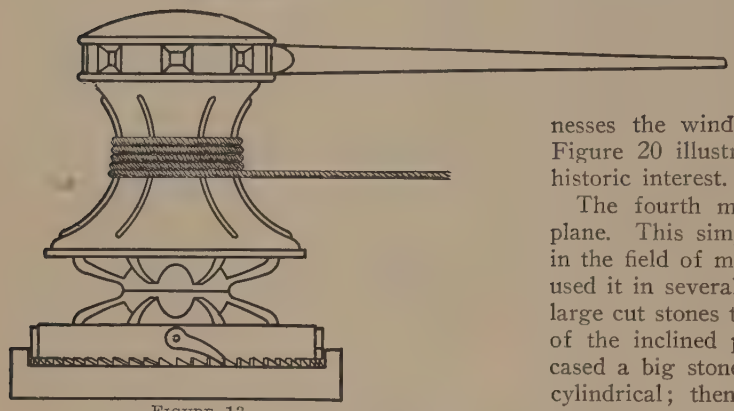


FIGURE 13

as a boy might rig up over the creek in camp or in the back yard. The overshot wheel, Figure 15, can easily be built by boys, for their camp fun. Figure 16 shows the action of the breast wheel, in which the water touches the wheel about level with its center.

In the turbine water wheels we have a different application of the power generated by falling water. Figure 17 shows a view looking down from above the wheel. The water falls down a shaft and strikes the fixed curved vanes (a), which direct the force against (b) the movable vanes of the wheel. As the force is expended against the moving wheel vanes, the water escapes from the outer rim of the wheel. In Figure 18 is represented a turbine wheel where the water approaches from the outside and is directed by the fixed vanes (a) against (b) the movable vanes of the wheel, and escapes through the center. This is known as a central discharge wheel.

Because of its historical interest, Archimedes' application of the principle of the screw for raising water should not be overlooked. The shaft or axle of this ancient contrivance, Figure 19, has an internal spiral passage, or pipe, and is set in a slanting position, the lower end being below the level of the water in the stream. The illustration in Figure 19 shows a crank attached to the shaft of the screw so that it may be turned. It was usual, however, to fit the lower end of the shaft with an undershot water wheel, which furnished the power to keep the shaft turning. As the shaft turns, the water continually seeks the lowest point in the curve of the spiral and, since the low point is continually moving up the spiral, it carries the water upward.

Another interesting application of the wheel and axle, or third mechanical power, is the modern windmill, which harnesses the wind to do the work of the farm. Figure 20 illustrates the old Dutch windmill of historic interest.

The fourth mechanical power is the inclined plane. This simple device has many applications in the field of mechanics. The oldest of builders used it in several ways. In the transportation of large cut stones the Egyptians used a combination of the inclined plane and the pulley. They incased a big stone with timbers, making the mass cylindrical; then, by means of ropes, rolled it up to the desired position. (See Figure 21.)

To figure the power required to move an object up an inclined plane, it is necessary to use the proportion P : W :: height of plane : length of plane. This does not take friction into con-

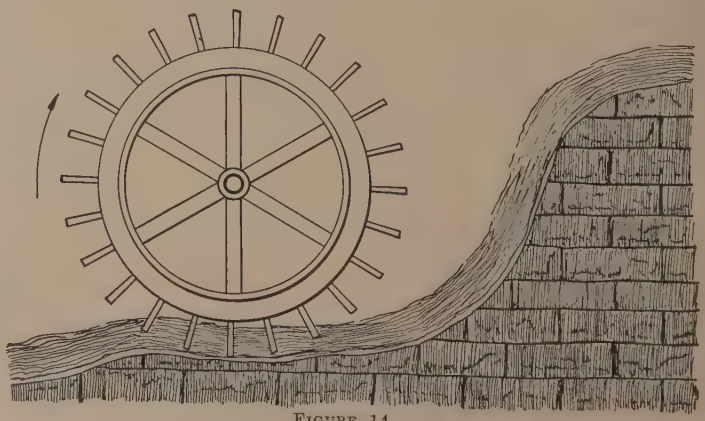


FIGURE 14

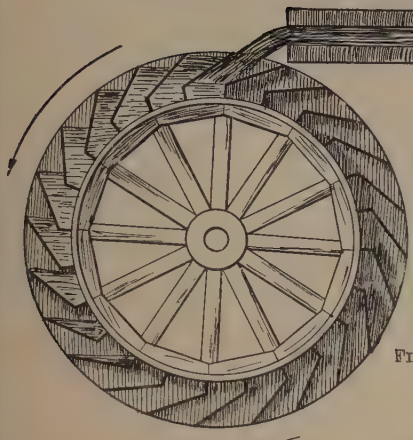


FIGURE 15

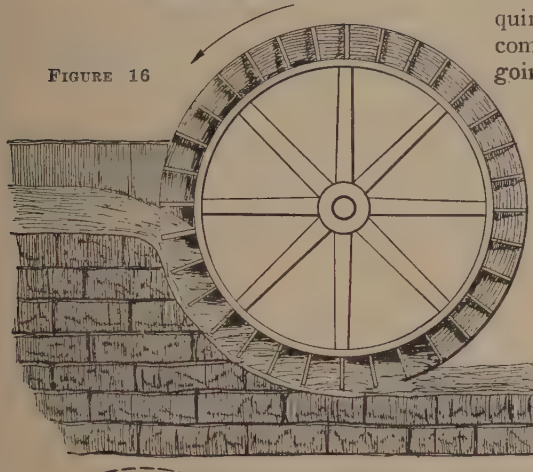


FIGURE 16

sideration. Therefore, the more nearly you are able to eliminate the element of friction, the more nearly you approach one hundred per cent. efficiency for the mechanical device. In Figure 21 the old Egyptians had comparatively little friction involved. In Figure 22, using small rollers, there would be more friction. In Figure 23 the sliding of a large object would involve a large amount of friction, which would require extra power to overcome. At this point I am going to suggest that you take your pencil and clinch the foregoing principle by figuring out how much you could move with your strong right arm, with some mechanical devices to help you.

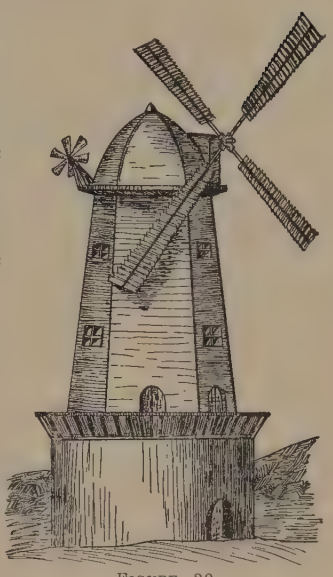


FIGURE 20

Suppose you have a big cylindrical stone to roll up a twenty per cent. hill, or a rise of 1 foot in every 5 feet traveled. Around the stone you have a rope arranged as in Figure 21. On the end of this rope there is attached the compound pulley block of Figure 9. The loose end of the pulley rope is wrapped around a 6-inch axle, or shaft, which has an 18-inch crank. If, by exerting 50 pounds of force on the crank, you can just move the stone, how much does it weigh? (See Figure 24.)

FIGURE 17

In this combination there are four devices used, each with its own mechanical advantage: the single pulley, the compound pulley, the wheel and axle, and the inclined plane.

FIGURE 18

The fifth application of mechanical power, which is *the wedge,* is a modification of the principle of the inclined plane. In the use of the wedge for raising objects or doing other

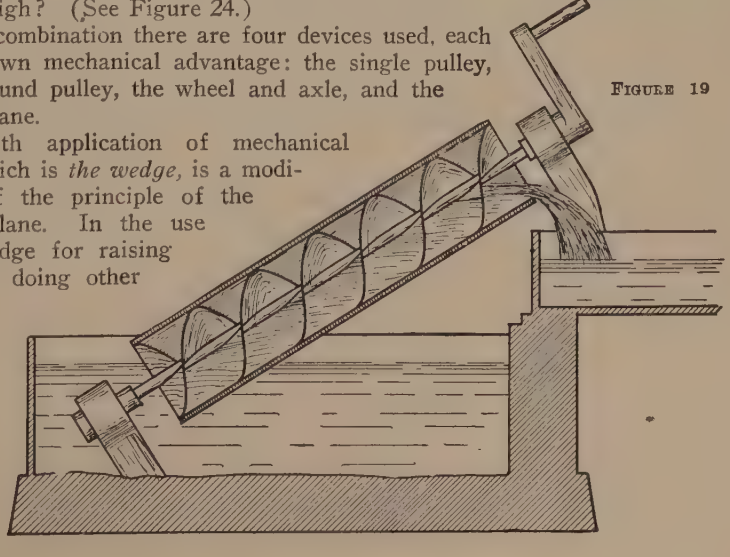


FIGURE 19

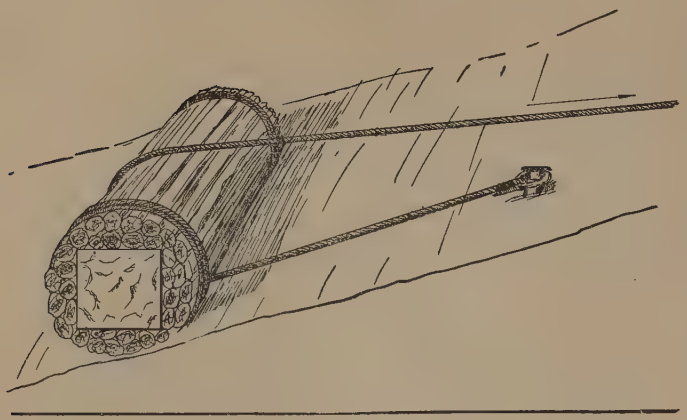


FIGURE 21

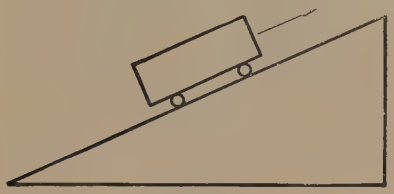


FIGURE 23

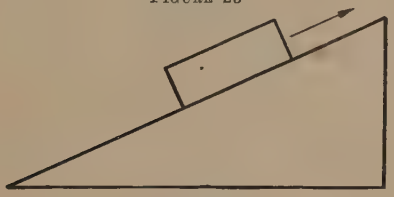


FIGURE 22

work, the effect of the power applied to the head of the wedge may be figured out from the following rule of proportion: The force exerted by the wedge is to the power applied, as the length of the wedge is to the thickness of the head. In other words, in Figure 25 the upward force exerted by the side (b) is to the power delivered by a sledge blow at (a), as (b) is to (a).

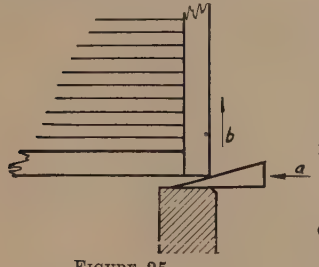


FIGURE 25

It can readily be seen why the wedge is so valuable in splitting cordwood. A common ax is, of course, a wedge, and, if one blow of the ax fails to split the log, it must be removed and another blow struck; but with the wedge the force of every blow by the sledge is held, or stored up, while another blow and its effect is added to the first, so that generally a very few blows split the log.

The last of the six mechanical powers is the screw, and, as was stated early in this article, it really is another form of inclined plane or wedge. The rule is to be used in computing its theoretical advantage is as follows: The force exerted is to the power applied, as the circumference of the circle described by the power is to the distance between threads. For instance: in Figure 26, a screw has 4 square threads per inch and the handle is 16 inches long; the gear is the same size as the shaft to which the weight is suspended. If the weight to be raised were 200 pounds, the power necessary to raise it would be found

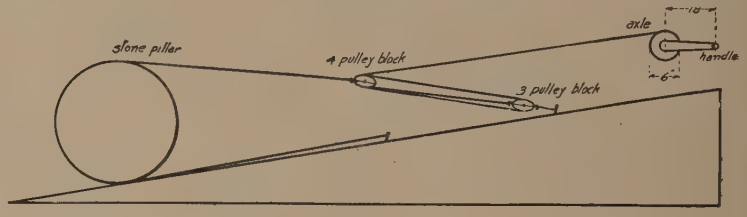


FIGURE 24

by the proportion: 200: Power:: $2\pi \times 16 : \frac{1}{4}$, or $\frac{350}{704}$ = approximately $\frac{1}{2}$ + lb.

A very modern use of the screw is seen in gearing of the rear of the one-ton Ford truck, Figure 27. The screw, or worm, on the end of the drive shaft engages the worm gear of the differential assembly, which transmits the power to the wheels through the axles. The same device is found in heavy kinds of modern machinery, and is very efficient.

Figures 28, 29, and 30 illustrate the pitch of a single, double, and triple "V" thread. The single thread has one spiral thread winding about the shaft. In one revolution of the screw a nut or engaging part would move a distance equal to the distance between the thread centers. For instance, Figure 31 shows a Jack Screw, used in raising houses from their foundations; one complete turn of the handle would raise the building as much as the distance from the center of one thread to the center of the adjoining thread. On a double-thread screw two parallel threads wind around the shaft, so that the distance

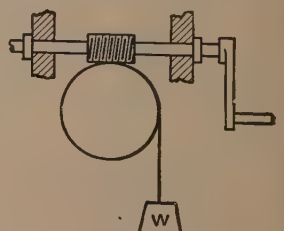


FIGURE 26

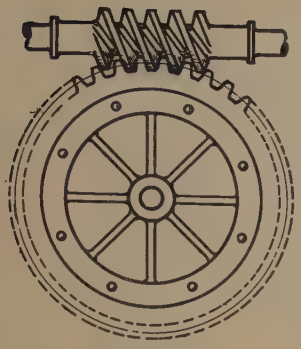


FIGURE 27

FIGURE 28

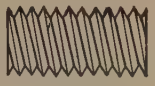


FIGURE 29

FIGURE 30

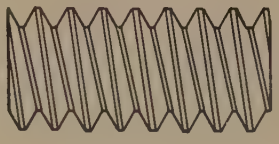


FIGURE 32

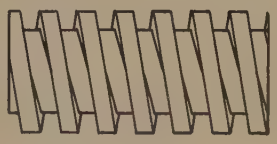


FIGURE 33

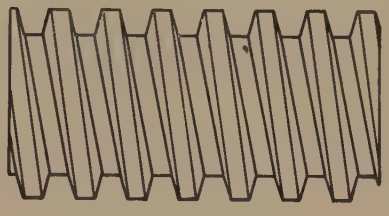


FIGURE 34

FIGURE 31

traveled by the shaft in one revolution is the distance from the center of one thread to the center of the second thread. This distance is called the *lead* of a screw. The *pitch* of a screw is always the distance from one thread to the next, whether it be single, double, or triple. From this it will be seen that on a triple-thread screw the lead will be three times the pitch. For efficiency or power the single thread is generally used, but when rapidity of action is necessary the double or triple thread is used.

Figures 32, 33, and 34 illustrate the U. S. Standard, the square, and the Acme threads. The U. S. Standard thread is the old "V" thread with ⅛ of the depth cut from the top and added to the bottom of the thread. It is the one used in this country for nearly all machine bolts and screws. The square thread is used on large operating screws in various machines. The Jack Screw, Figure 31, is a simple illustration. The Acme thread is the one found on the lead screw of an engine lathe. Each side of the thread slants fourteen and one-half degrees, making the total angle between the sides of the thread twenty-nine degrees. The sides of the Acme thread are given this slant so that the threads of the half nut will engage more readily and smoothly when meshed with it, and also to take up for wear of threads.

In the foregoing pages the principles of the six mechanical powers have been described. In the mechanical world these six powers are found in all sorts of combinations, sometimes so disguised that they are hard to recognize. Every boy, however, should be familiar with some of the more common mechanical devices and be able to recognize the principles involved.

Figure 35 illustrates the simple valves found in a lift pump. By the sucking action of the piston, when the handle or lever is pushed down, water is drawn into the chamber through the lower valve, which closes at the end of the stroke and holds it until carried up by the next stroke.

Figure 36 represents a force pump. As the piston moves upward, the water is drawn into the cylinder through the lower valve. As the downward stroke begins, this valve closes and the water is pushed through the side outlet past the upper valve, to be held there at the end of the stroke until the next stroke of the piston pushes another charge of water through the valve.

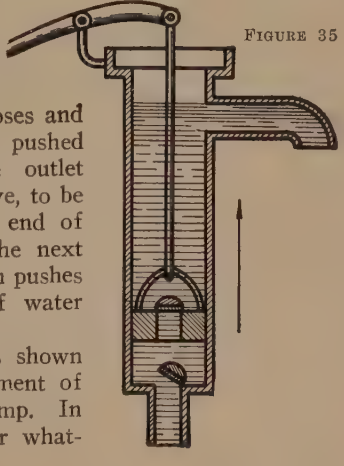


FIGURE 35

In Figure 37 is shown the valve arrangement of a double-acting pump. In this case water, or what-

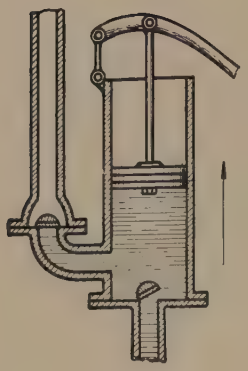


FIGURE 36

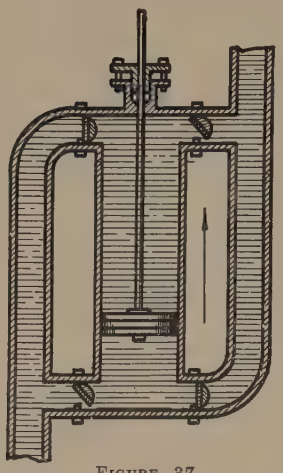


FIGURE 37

ever is being pumped, is coming in and going out with both movements of the piston, so that the flow through the pipe is practically continuous, or steady. Other very interesting valve actions are found in steam and gasoline engines.

FIGURE 38

Figure 38 illustrates the "lazy tongs" as applied to toy manufacture. When the handles are brought together, as in a pair of shears, the length of the "tongs" become much greater. Boys can easily make them with thin strips of wood. Then, by mounting a clown face on the end and covering the body of the "tongs" with cloth, a toy is made which never fails to delight the younger children.

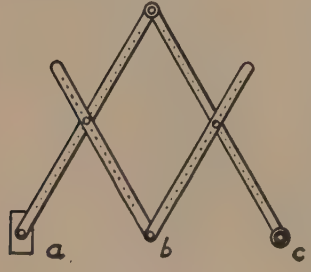


FIGURE 39

The pantograph, Figure 39, is a copying device employing the same principle as the "lazy tongs." *a* is a fixed point, *b* is the ivory tracing point, and *c* is the copying point. When the tracing point *b* is made to follow the lines of the drawing to be copied, the point *c* reproduces the drawing at whatever scale is desired. This scale is governed by changing the position of the central links on the main bars of the pantograph.

Still another form of link device is employed in the ice tongs of Figure 40. The pull on the two links causes the tongs to press into the ice. The heavier the weight, the harder the pinch of the tongs.

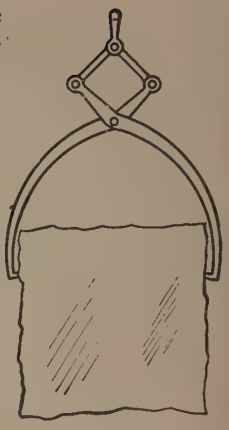


FIGURE 40

Rachet devices are a very necessary part of many machines. Figure 41 illustrates the rachet control at the bottom of a street-car hand brake shaft. The pawl (a) is controlled by the brakeman's foot. Other forms of ratchet motion are found in hand drills, bit braces, windless controls, and various machine parts.

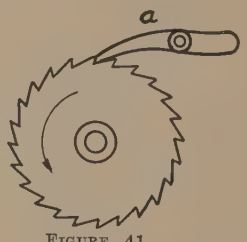


FIGURE 41

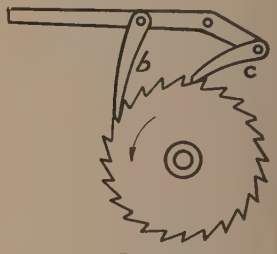


FIGURE 42

Figure 42 presents a form of intermittent circular motion. The vibrating lever moves the ratchet wheel by means of the two pawls (b) and (c). The lever acts alternately as first and second class.

One of the most interesting, and perhaps most numerous, of the mechanical movements is the cam movement. Cams are employed where irregular, intermittent motion is desired. One illustration is found on an automobile cam shaft, Figure 43. As the cam revolves on the shaft, the circular shape of at least half of the cam outline allows the valve to remain closed, but as the extended part of the cam comes in contact with the bottom of the valve stem, the valve is quickly opened and just as quickly closes again as the cam revolves.

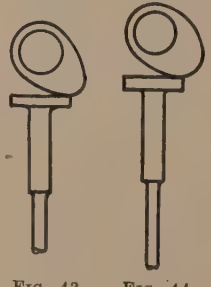


FIG. 43 FIG. 44

Suppose a cam which would raise a stem or rod

quickly and lower it slowly were to be employed, its shape would be similar to Figure 44. The part of the cam outline which causes the rod to rise is only about one-third of the revolution, while the other requires two-thirds of a revolution and is

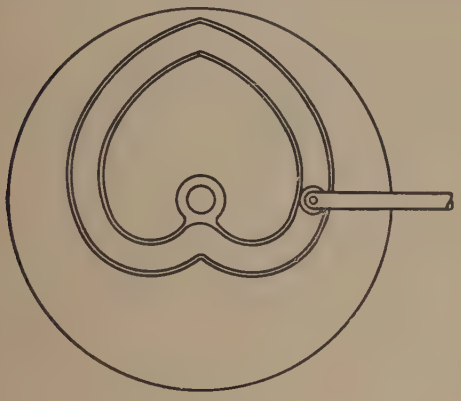


FIGURE 45

involute in shape. An involute curve is such as would be generated by the end of a thread which is being kept taut while unwound from a spool.

Figure 45 shows a form of cam which is found on some printing presses. The follower on the end of the rod, or arm, runs in the groove of the cam as it revolves and causes the arm to move back and forth with one long and one short motion during one revolution.

In Figures 43 and 44, a spring is responsible for the prompt return of the valve stem, but Figure 46 illustrates a cam motion which is entirely dependent on the cam for return.

Figure 47 is a sketch of a gyroscope, which illustrates the tendency of rotating bodies to maintain their plane of rotation unchanged. When the disk (a) is set in rapid rotation upon its bearings in the ring (b), and the extension to the ring placed in the socket on the top of the pedestal (c), the ring and disk do not fall, but maintain their elevation and begin to revolve

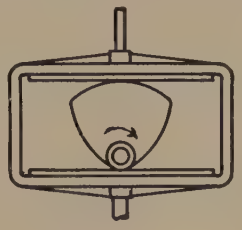


FIGURE 46

around the pedestal. This property of a revolving disk has been used to great advantage in stabilizing airplanes and ships, and has even made it possible to run trains on one rail instead of two. A heavy disk is made to revolve at a high rate of speed, and, while it maintains this speed, it is very difficult to shift its plane of rotation. Consequently, this force is able to keep in balance large bodies which may be dependent upon it for support.

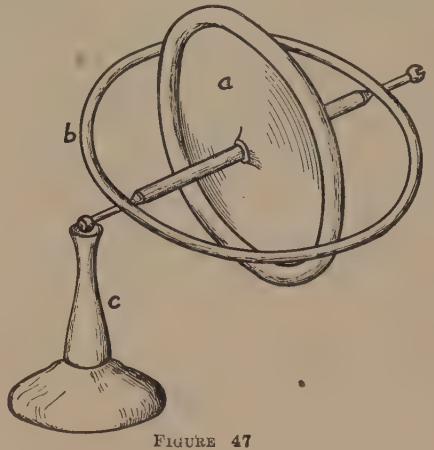


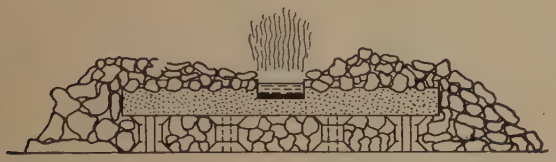
FIGURE 47

SOME FASCINATING EXPERIMENTS IN CHEMISTRY

BY O. IVAN LEE

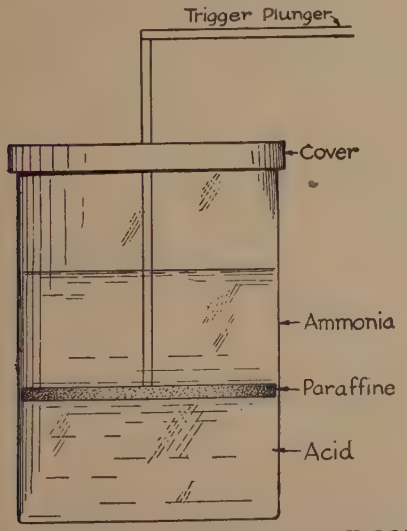
HOW TO MAKE A WITCH'S CALDRON

Get a tin pie-plate and put it in the middle of the floor on top of half a dozen spools placed under the edge at equal distances. Pour sand or gravel on the pie-plate until about half full;



CROSS-SECTION OF WITCH'S CALDRON SHOWING METHOD OF CONSTRUCTION

smooth it over somewhat, and in the middle set the top of an empty baking-powder or cocoa can, like a little well. Stick a lot of stones and pebbles in the sand, and place some bigger stones on the floor around the rim of the pie-tin, in order to hide it.



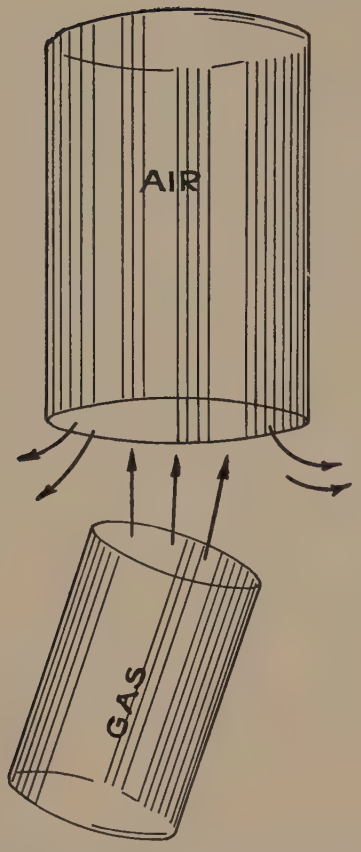
FIRELESS SMOKE AND NOISELESS EXPLOSION

Now pour some wood alcohol into the little tin cup, but do not fill it to the top. Stir in about a teaspoonful of boracic or boric acid (you'll find this white powder in the medicine chest). Also add half a teaspoonful of salt to the mixture. Have everyone seated on the floor around the caldron; put out all the lights, and light the alcohol as you would a lamp or gas light. Don't be afraid, because alcohol never explodes in an open dish; but don't forget that the fire is very hot. The flames will leap up several inches, and will be colored a beautiful apple green, and bright yellow. The light will make all your friends look so ghastly that you will scarcely know them.

It is just the thing for Hallowe'en and ghost stories. There is no smell, and only a very little white smoke, which is quite harmless, so that the caldron may be burned indoors without objectionable fumes. For convenience, however, it may be found advisable to erect the whole arrangement on a piece of sheet metal or even a board. One thing must be remembered very carefully, though. Never pour any alcohol into the cup while the fire is burning.

HOW TO MAKE A POWDERLESS CANNON

Punch a nail hole in the bottom of a medium-sized tin can (2-lb. size) with a fairly tight-fitting cover. Take the cover off a smaller (½-lb.) can, and hold it upside down over a gas-jet. Turn on the gas (which is lighter than air) until it has filled the can and overflowed at the bottom. Take the cover off the larger can, and, holding it upside down next to the small can, turn the smaller one right side up under the big one just a moment (not forgetting to keep a finger over the hole in the bottom of the big can). Then slip on the cover of the big can, still keeping it upside down, and lay it on the ground. Put your foot on the can, take a long



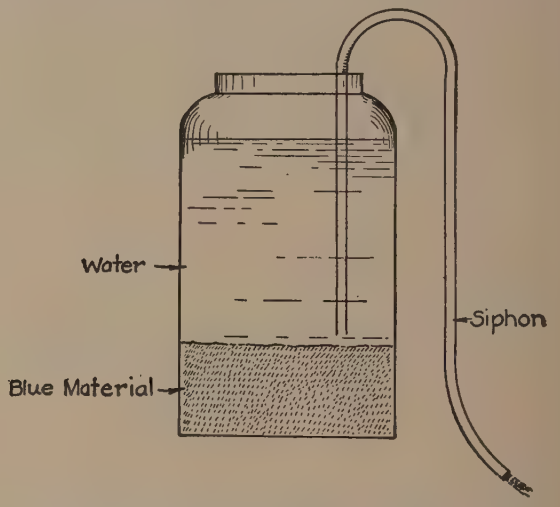
METHOD OF FILLING POWDERLESS CANNON BY PARTIAL DISPLACEMENT OF AIR BY GAS

breath, and touch a lighted taper to the nail-hole. Results will be immediate, gratifying, and harmless; but a little experimenting will probably enable you to get even better effects.

HOW TO MAKE A LIQUID WHICH WILL DISSOLVE COTTON, PAPER, OR LINEN

From the druggist or electrician get three ounces of some of those beautiful blue crystals called blue vitriol or blue stone. A more correct name is copper sulphate. Dissolve them in about a quart of cold water in a glass jar or vessel—a 2-quart fruit jar is convenient. Stir with a clean stick from time to time. It may take quite a while, even over-night, before the crystals are all gone, especially if they are large. Meanwhile, in a pint fruit jar, dissolve an ounce of soda lye or potash lye (the kind used for making soap), stirring with another clean stick, and afterward screw the cover on until the blue solution is ready. Then slowly pour the lye solution into the copper solution, stirring all the while with a stick. A very pretty cloudy light blue material will immediately be formed, and after the lye is all in will show a tendency to settle down gradually to the bottom of the jar. Enough lye should be added so that no copper sulphate is left to make a more or less clear blue solution above the blue substance. If this material doesn't show signs of settling, add more water, if need be transferring to a larger jar.

Now comes a time when you will need the patience of a real chemist. When the blue compound has settled as far as it will go, take off



LIQUID FOR DISSOLVING COTTON WASHING WITH SIPHON

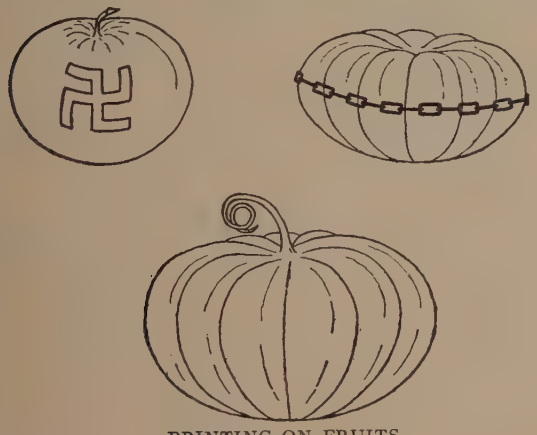
the water above it, either by dipping it off very carefully with a small glass or porcelain cup, or better still by using a siphon. (It is not advisable to try to pour it off.) For this you need only a rubber tube about 18 inches long. Fill it completely with water, pinch both ends, slip one end into the water in the jar, keep the other below the level of the bottom of the jar, draining into the sink. When you release your fingers, you'll be surprised to see how easily the water runs up hill, and down again. Don't kink the tube; keep the inside end under water; keep the lower (outside) end below the water level. Get off as much water as you can without disturbing the blue sediment; fill the jar with pure water, and stir everything up again with the stick. When the blue precipitate has gone to the bottom, drain off the top water as before, add more fresh water, stir, and let settle. Repeat this washing process 10 times after you can no longer taste anything in the water above the blue stuff.

Finally, after draining off the water for the last time, add ammonia water* to the blue residue, little by little, stirring this time with a long piece of glass. It will slowly dissolve the blue mud, and make a beautiful deep sapphire blue solution. Do not add any more ammonia than is necessary.

Pour off the deep blue liquid resulting, and hold a piece of cotton in it. In a very short time the cotton in the liquid will melt like snow, and disappear completely. Now try a piece of unglazed paper. It will dissolve like sugar in hot coffee. After this, try a piece of linen from an old handkerchief or napkin. Presto! it is gone! But if you put a piece of wool or silk in this wonderful solution, nothing happens, because they are of animal origin, and very different chemically from the cotton, paper, and linen of the vegetable kingdom.

HOW TO PRINT PICTURES ON APPLES, TOMATOES OR PUMPKINS

If possible, select apples growing on the tree, and of a variety which is known to be colored



PRINTING ON FRUITS

(yellow or red) when ripe. Pick out a dozen or so which are easily reached, and have developed to full or nearly full size. They must, however, be green, or better, just beginning to show a tinge of color. See that they are smooth and firm, free from worm-holes, and firmly attached by the stem.

Now get some glazed black paper, or some of that black paper which comes around camera plates and films, and cut out any silhouette figures which suit your fancy, such as a swastika sign, initial letters, etc. If you are clever with the scissors, you may even essay dancing figures, or something equally artistic. Do not make them too large—1½ inch in height is about right. Now wipe the fruit with a cloth moistened in a little alcohol, and glue or paste the cut-out figures firmly and smoothly on the apples, favoring the sides which you think will get the most light. Some care will have to be exercised so as not to break the apples from their stems. When the paper figures are quite dry, and show no signs of peeling at any point, go over them once with a light coat of shellac. This will effectually prevent dew or rain soaking the paper off. Little remains but "watchful waiting." Inspect your "prints" every day, repairing any curling which may occur. When the fruit has attained a decided color, pick, and soak a few minutes in cold water, sponging off any shellac remaining with a little alcohol. You will find a sharp impression of your paper cut out in green on a yellow or red background, as the case may be, the contrast being very striking.

With picked fruit, similar results may be obtained, although not with as much certainty.

Tomatoes do not come out quite as satisfactorily because their inside turns red as they ripen. However, the results are well worth the trouble. Those trained on a trellis are to be preferred, otherwise mud and rain may spoil your experiment.

In the case of pumpkins, paste your pictures on top.

A GOOD SECRET OR INVISIBLE INK

Almost every one has wished at one time or another for a good secret or sympathetic ink—one that is cheap and easily obtainable, really invisible when written, easy to develop, and easy to read when brought out. An ink not generally known which answers these requirements is a solution of chloride of ammonia, ammonium chloride, or sal-ammoniac, as the electrician calls it. It is used for charging the wet batteries for ringing door bells.

Make a strong solution of this chemical in a clean bottle; get a new pen-point (one that wo n't scratch), and clean the lacquer from it by scraping, sandpapering, or washing in alcohol. Draw or write with the solution on a piece of clean white paper, viewing the writing horizontally against the light to make sure that the pen point has not "skipped." You want a pen which is absolutely dependable, and won't miss a dot, since in use you will be writing "blindly."

*Household ammonia will do nicely, provided it is pure and clear and has n't any soap in it. Anything of this kind can be detected by letting a spoonful of ammonia evaporate in a saucer near the stove. Pure ammonia, like pure water, will disappear, and leave nothing behind.

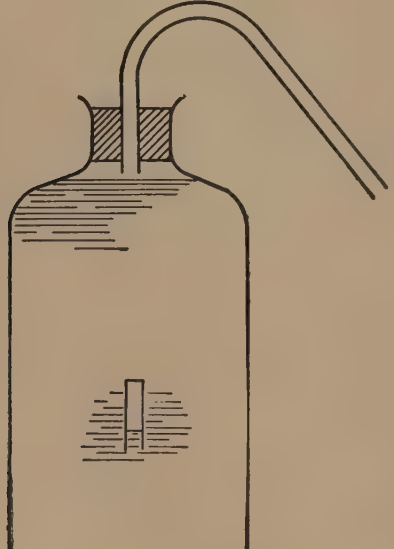
When the ink has dried, examine the paper again very carefully to see if you can make out any trace of what you have written. Very likely you can. If so, add a little more water to the ink and try again until nothing whatever can be detected on the paper after the ink is dry. The idea is to get the ink of such a strength that it will soak into the paper without leaving any tell-tale crystals of sal-ammoniac on top.

To bring out the writing, heat the paper written upon strongly. This can be accomplished by pressing with a hot flat-iron, or heating in an oven, or over any burner. A little practice will soon give you the knack of it. The writing will appear brown to jet black, depending upon the amount of heating, and is absolutely indelible, the lines being virtually burned in.

Always wipe the pen dry after using.

THE MAGIC LUNG-TESTER

Find a large bottle which is square, or better, oblong, in cross section, and the walls of which appear to be thin enough to allow of a slight amount of "give," yielding when strongly pressed. You cannot see any movement of the glass, but can sense that it is not as solid as that of an ordinary round bottle when squeezed between the fingers. Also get a straight glass vial, small enough to slip easily into the neck of the large bottle, a tight-fitting cork stopper for the latter, a piece of glass tubing about 6 inches long and ¼ inch in outside diameter, about 6 inches of rubber tubing to fit over the glass tubing, and a little piece of thin, transparent celluloid, or mica.



THE MAGIC LUNG-TESTER

Using a small rat-tail file, make a hole in the cork into which the glass tube will slide snugly. With a sharp three-cornered file nick the glass tube about an inch from one end, break it, and file one end of each piece flat and smooth by rubbing down on a flat file with a little water. Cut out a little circle from the celluloid, or mica, just the size of the glass tube. Fill the large bottle brimming with water. In a glass jar or pitcher, float the little glass vial mouth downward so that the bottom of the vial is flush with the surface of the water in the dish. This can be done by admitting more or less air into the vial, and when the best adjustment is reached, the merest touch to the floating vial will send it downward, only to bob up again. While the little bottle is floating on the surface, slip your middle finger very carefully under the mouth, putting your thumb on the bottom, and transfer it to the large bottle. Be careful not to press any water up into the vial when you put your finger over it, and also not to let any air in when you are floating it in the neck of the large bottle. Push about half the water out of the neck of the large bottle (do not try to pour it out), and slowly push in a cork without any hole in it. At a certain point you will be surprised to see the small bottle quickly drop to the bottom; and it will stay there until the cork is drawn out a little, when it will bob up. Push the cork in again slowly, until you find that just a twist is enough to start the vial down. If this adjustment has been carefully made, the little bottle delicately floated, and the large bottle properly selected, you will be astonished to find that you can make the little bottle go up or down or stay anywhere commanded, just by more or less pressure on the flat sides of the big bottle. The thumb and fingers of one hand should be sufficient to do this.

Arrived at this point, take out the cork and replace with the cork with the hole in it, first inserting the glass tubes with the mica, or celluloid, circle between the filed ends hidden inside the cork (see cut).

The upper tube should be 5 inches long, the lower one, 1 inch, and should project but a very short distance (⅛ to ¼ inch); that is, it should not touch the water. Adjust this cork with the tubes just as you did the other, so that a fairly strong pressure on the big bottle will make the diving bottle submerge.

Finally, slip on the rubber tubing on the upper tube, and you are ready to try out your "lung-tester" on the young man who prides himself on his chest measurement. Demonstrate how easily you can "blow" the little bottle down, and then pass the "tester" to him.

He will doubtless get very red in the face, but will have no luck at all. After he is discouraged a little, remove the rubber tubing and let him peer down through the glass tube, after which he will be more mystified than ever.

If the cork is a good one, and the connections are carefully made, and air tight, the apparatus will work without any adjustment for a long time; but, of course, it is always best to make a private trial before a public exhibition.

HOW TO MAKE SOLID ALCOHOL

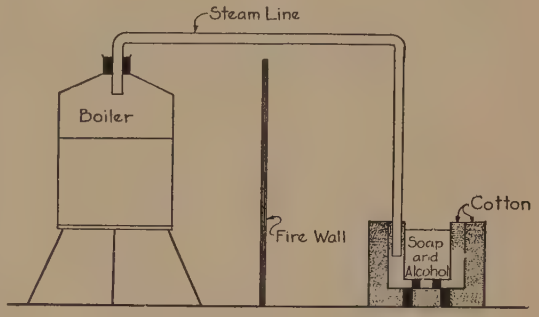
A tin can of about a gallon capacity is the first requisite for this experiment, and means for heating water in it. A short metal or glass tube, preferably L-shaped, is inserted in the cork fitting the outlet hole. To this is attached a flexible metallic gas-tubing about 6 feet long, terminating in a tin can of about a quart capacity (a lard can is about right). Punch a nail-hole about 1 inch from the bottom, and put in a couple of short sticks ½ inch square. Now place a baking-powder can in the quart can, supporting it on the blocks of wood, and after inserting the free end of the gas-tubing between the tin cans, pack the upper portion of the space with cloth or cotton.

If possible, arrange to have the boiler can and double boiler on separate tables or benches; but if this cannot be done, put a large board or metal partition between them. This is to serve as a fire wall against any alcohol vapor from the experiment creeping along the table and catching fire.

Previous to setting up the foregoing apparatus, grate or shave a cake of good white hard soap into thin pieces, and dry it in an oven at a very moderate temperature. The object is to drive out the large amount of water which all soap contains, without melting the material. This may take some time; but it is better to take longer, and be sure the soap is dry, than to try to hurry it, and melt it. When the soap is perfectly dry and powdery to the touch, pour the baking-powder can about half full of grain alcohol (denatured). Since a baking-powder can is not always water-tight, it is just as well to take the precaution of testing it for leaks with some alcohol.

Now get up steam in the boiler, and shortly after steam passes into the space between the two cans, the alcohol will boil. With a spoon, sift in the dry powdered soap a little at a time, stirring continuously. The soap will dissolve, although the solution may be rather muddy-looking instead of clear. Keep adding soap until no more readily dissolves, adding a little alcohol occasionally to replace that which is lost from boiling. If the solution does not boil as easily as at first, cover it up with a little saucer for a while.

When as much soap as possible has been dissolved, turn off the steam, and let the alcoholic soap solution cool. At a certain point, it will suddenly freeze, and become completely solid.



MAKING SOLID ALCOHOL

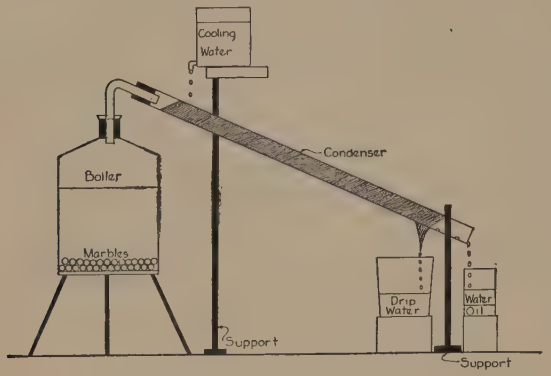
When perfectly cold, run a thin sharp knife around the inside of the can, or immerse it for a moment in a pan of boiling water, and you will be able to slide out a white cylinder of "solid alcohol." It looks much like soap, except that it is not quite so hard, and may be cut into convenient-sized cubes, or sliced into smaller cylinders.

If a match is applied to one of these, it will ignite readily and burn with a hot pale blue flame for ten minutes or so, leaving a residue of soap. The "solid alcohol" should be preserved in friction-top cans until wanted for use, as otherwise the alcohol slowly evaporates. It is very popular with campers because of its safety and convenience, for after one has cooked a meal over "solid alcohol," the soap that remains may be used to wash the dishes!

HOW TO PREPARE THE ESSENTIAL OIL OF CLOVES

In the spice known as cloves, which consists of the dried flower buds, there is a very considerable amount of an oil of a spicy, agreeable odor reminding one of carnations. It is very

interesting to obtain this oil in a pure form by the process called steam distillation, and this operation may be carried out very successfully with comparatively simple apparatus.



DISTILLING OIL OF CLOVES

After obtaining several ounces at least of whole cloves from the pantry, grind them in a coffee mill. Then get a tin can (one with a sloping top is to be preferred) of a capacity of about two quarts, and put in enough marbles or small clean pebbles to cover the bottom to a depth of an inch or so. After this get a section of gas or water pipe between ½ and 1 inch in diameter outside, and about 6 feet long, and clean it inside as thoroughly as possible; do the same to the can. With a round file, drill a hole in each of two clean corks fitting the ends of a short bent tube of glass, brass, or copper. This goose-neck tube, as it is called, is to connect the outlet of the "boiler" with the upper end of the gas-pipe, which is placed in a sloping position. Support it firmly at top and bottom with wooden uprights. Loosely wrap the whole length of the pipe between the points at which it is supported with a long strip of soft absorbent cloth, letting the lower end hang down in a pail or large pan. Above the upper end of the gas pipe which is to serve as the condenser for the steam, place a large tin can with a small nail hole in the bottom. Have this opening of such a size and in such a position that as much water as possible soaks the cloth and runs down into the pan below without dripping off much on the way. If any trouble is experienced in adjusting the flow of cooling water, make the slope of the pipe a little steeper. Provide a glass jar or vessel to receive the condensed water and oil coming from the open end of the pipe. Some source of heat such as a gas or kerosene stove must, of course, be provided to boil the water in the boiler.

When everything has been set up as described, fill the boiler can about half full of water, put in the ground cloves, connect the bent tube to the sloping gas pipe, and light the fire.

As soon as the water comes to a boil, start the water running down the condensing pipe. The cooling water may be dippered back into the upper reservoir from time to time, but after a while it will probably get so warm that steam comes from the end of the pipe. Fresh cold water should then be used. Too big a fire, too short a gas pipe, or too little cooling water, may cause the same result.

A more or less milky mixture of oil and water will drip from the end of the pipe, but in a short time you will see a clear, pale-yellow oil sink to the bottom in a layer underneath the water in the receiving vessel.

Continue the distillation as long as any oily drops seem to be coming over, changing the receiver, if necessary. Of course, there will be much more water than oil, but from three ounces of cloves almost half an ounce of oil should be obtained. With a little care, the water can be drawn off or decanted from the heavier oil. The oil of cloves which remains may then be freed of any water still mixed with it by passing it through a little cone of dry white absorbent paper into a small vial. To make this filtering cone, simply cut out a 3-inch wide circle of the paper, fold it across the middle, and crease the semicircle into quarters; open one fold.

Naturally, the essential oil of cloves is about six times as strong as the clove itself, representing, as it does, the very essence of the spice. Bearing this in mind, it may be used for the same purposes and, in fact, it is really much superior.

HOW TO MAKE A BURNING GAS (HYDROGEN) AND A BURNING OIL FROM CASTOR OIL

Castor oil, of unpleasant memory to many of us, is an extremely complicated substance chemically, and a great variety of interesting and useful things may be made from it, depending upon how it is treated. Among these is the wonderful hydrogen gas with which balloons are inflated.

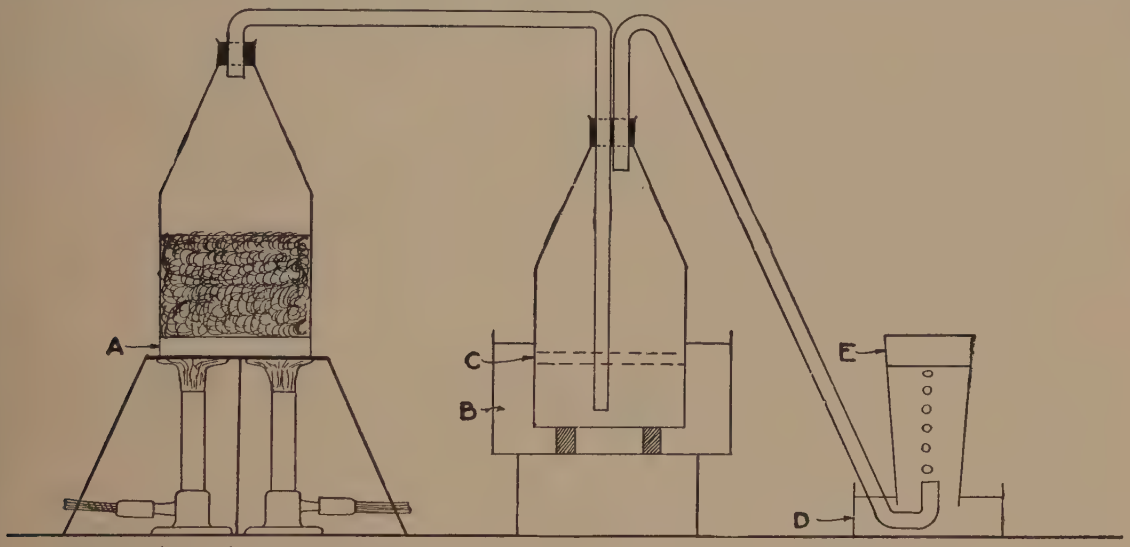
Get a couple of quart tin cans (a fire to heat one of them), another larger tin can with the top cut out, a water basin, a glass pitcher (or large olive bottle), and three glass or metal L-tubes, with some rubber tubing for making connections. One of the L-tubes has one long arm; the other, two. Connect the two tin cans

as indicated in the drawing, making one of the long arms of the second L-tube extend nearly to the bottom of the second can, which is half-filled with water. An outlet connected to a couple of feet of rubber tubing is made with the third L-tube, and leads from the second can to the water basin. This is partly filled with water. Drill the corks used, and make all the connections air-tight.

Set the second can in the larger can, and pour water into the space between. This is for cooling purposes.

Into the first can put 1¼ ounces of water, and 2 ounces of soda-lye, warming the mixture till the lye is dissolved. Then add ½ pound of castor oil. Connect up the apparatus, and light the fire under the first tin can. To avoid direct contact of the flame with the bottom of the can, put a piece of sheet tin under it. Soon after the fire is lighted, bubbles will be noticed coming from the end of the rubber tubing in the water. These are bubbles of air driven out by expansion, due to the heating. A little later, some white smoke may appear with a peculiar sweetish odor. When the bubbles begin to come at a more rapid rate, fill a long slender vial or bottle with water. Cover the end with your finger, and turn it upside down with the mouth under the water in the basin.

Now catch some of the bubbles coming from the end of the rubber tube. The water in the bottle will rapidly be driven out. When this has occurred, place your finger over the mouth of the bottle again, strike a match, and holding the vial pointed away from you, apply the flame of the match as soon as you remove your finger. Very likely you will hear a sharp "pop," and you may see a little flame flash down inside the bottle. On the other hand, if nothing happens, only air is coming out, and not air and hydrogen, which together are explosive. Hydrogen alone burns but will not explode, so when the air has been all pushed out by the hydrogen, a sample of gas, caught and burned as described, will burn quietly. If you watch closely you may see the hydrogen flame as it sinks down into the bottle. No attention need be paid to any white smoke which may accompany the hydrogen gas, as it will disappear on letting the gas stand over water. A larger volume of hydrogen may be trapped and stored in the water pitcher, which is to be supported by an inverted tin can with a small hole cut in the bottom, and another near the rim of one side for the insertion of the gas-tube. The can is placed under water, of course, with the pitcher of water upside down on it.



OBTAINING A COMBUSTIBLE OIL AND A COMBUSTIBLE GAS FROM CASTOR OIL

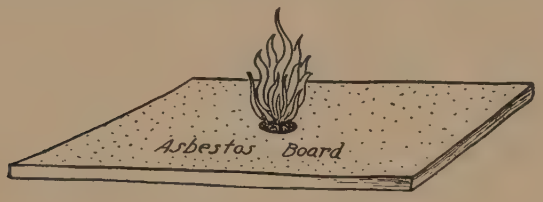
The experiment with the powderless cannon may be very successfully carried out with hydrogen instead of gas, the "gas-jet" in this case being the end of the rubber tube.

After the hydrogen has ceased to be given out

to any extent, if the water in the second can is poured into a bottle, about two ounces of a deep yellow oil of peculiar odor will float on the water. If it is removed, and a light applied, it will be found to burn as readily as kerosene.

"SPONTANEOUS COMBUSTION"

In the first place, there is no such thing as "spontaneous combustion." If a fire starts, there is always a perfectly good reason for its starting, although it may be very puzzling if all the facts are not known. What is meant, then, is that the mysterious fire starts apparently without any direct human aid, but since nature is always "on the job," there is no magic about the matter. The whole term is based on popular ignorance of natural laws, of the kind which leads some to waste their time and money trying to discover perpetual motion.



SPONTANEOUS COMBUSTION

A striking demonstration of the kind of combustion, the origin of which would be conveniently described by the newspapers as "spontaneous," may be made with ten cents' worth of chemicals obtainable at any drug store—five cents worth of glycerine, and the same amount of permanganate of potash. This last is a violet black crystalline powder, of which a minute particle will color a glass of water a beautiful purple. Rub a half teaspoonful at a time between two flatirons until it is a fine powder. Collect a couple of spoonfuls into a little heap on a slab of stone or iron, and make a slight depression in the top of the heap.

Now quickly let fall about a dozen drops of the thick, sweet, harmless looking glycerine into the little hole in the heap of powdered permanganate. For a moment you'll be disappointed; nothing seems to happen. Then there are signs of action. The glycerine is uneasy, and begins to bubble; then smokes and fumes. In a flash, the whole mass bursts into a hot and dazzling violet flame resembling a miniature volcano, for sparks and clouds of smoke are not lacking to complete the illusion. It will need little imagination to conjure the possibilities of such chemicals starting trouble if broken cases should get them to rubbing elbows in transit. Fortunately, there are not a great many combinations which are so energetic, but the moral is: No matter how mysterious the fire, there's a reason.

HOW TO MAKE FIRE BURN ON ICE

Carbide, or more properly calcium carbide, is a wonderful substance made in the electric furnace by heating lime and coke. It is a hard gray crystalline material, and no doubt familiar to you as the gas-generating medium employed in some kinds of bicycle lamps. When brought in contact with water, it instantly liberates the gas, acetylene, which gives a brilliant light when properly burned. This property can be strikingly demonstrated in the following manner:

Place a few lumps of carbide on a block of ice. Above the freezing point of water (32° F.) ice is always covered with a film of water sufficient to start some action with the carbide. The heat generated by the chemical reaction melts

THE BLACK SNOW-STORM—HOW TO MAKE FIRE BURN ON ICE

more ice, making more heat, and generating more gas, so that in a moment the lumps will have begun to bore little holes in the ice. If a match is applied, the escaping acetylene gas ignites and burns with a bright but smoky flame, so that to the observer the ice appears to be burning. Since acetylene gas contains over 92 per cent. of carbon, when it is burned in the air without special burners, there is not enough oxygen to burn all this carbon up. As a consequence of this richness in carbon, or in sufficient oxygen, a veritable "black snowstorm" results in a few minutes. On this account it is advised that the experiment be performed out-of-doors, but not on Monday!

A BEAUTIFUL EXPERIMENT

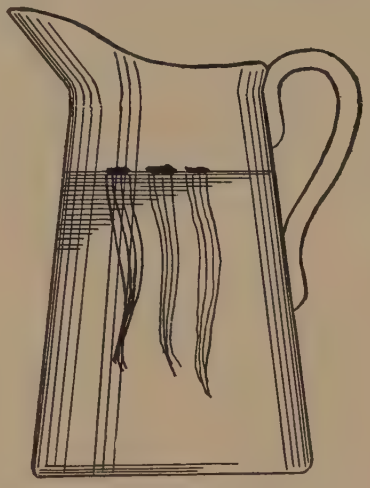
Most substances which dissolve in liquids to give colored solutions, confer the same color on the fluid regardless of whether you look at it or through it. For instance, if a little bluing is put into a glass of water, the water looks blue, no matter how you look at it, the only difference being that in some positions the color may appear darker than in others. In the language of science, the light transmitted is the same as that reflected. There are a limited number of substances, however, which in solution have the wonderful power of reflecting a different color of light from that which they transmit. One of these substances is the dye eosin, which is widely used for making red ink.

Fill a tall glass pitcher or similar vessel with water, and if possible put it in bright sunlight. When the water is quiet, drop a little red ink on the surface with a medicine dropper. As the dye dissolves and descends in smoke-like swirls, you will be astonished at the delicate apple-green color reflected entwined with the rosy pink to be expected. The green color may be intensified by viewing the solution against a black background. On the other hand, if you hold the solution against the sunlight, or look through it at a sheet of white paper, it will appear almost exclusively pink. If the solution is diluted with increasing volumes of water, you will find that the green light is much more persistent than the pink, and will manifest itself long after the pink has vanished.

If no red ink is available, perhaps you have some quinine tablets in the medicine chest. Sprinkle a bit of this on the water, or dissolve the pill, if it is in pill form (if in a gelatine capsule, remove from capsule before using). Then add a few drops of the sulphuric acid. If not to be obtained elsewhere conveniently, take a little from a storage battery, using a glass tube. As soon as the acid enters the solution, you will observe beautiful sky-blue streamers of light, yet if the solution is held against the light it will be found entirely colorless!

Supposing that you have been disappointed in your search for red ink, or quinine, and sulphuric acid, perhaps you know where there is a horse-chestnut tree. If so, take a sharp penknife along, and when you have found the tree, cut away a small square of the rough black outer bark, and remove a few splinters of the soft red inner bark. Drop these on the water, as described in the experiment with red ink and quinine. As with the latter, a powerful bright blue light floats down from the surface of the water. The effect is particularly fine when viewed from above, for then the blue light appears more concentrated, and it will be noticed, also, that the inside of the glass vessel, especially that nearest the source of light, appears to be lined with a kind of halo of blue light. As in the previous experiment, however, the water appears nearly colorless against white paper. On standing a while, a red coloring matter in the bark, having no connection with the substance causing the blue light, dissolves out, and somewhat obscures the blue color.

In general, these experiments cannot be so successfully carried out by artificial light, unless



A BEAUTIFUL EXPERIMENT WITH THE BARK OF A HORSE-CHESTNUT TREE

an especially powerful light is used, such as an acetylene bicycle lamp. Since the particular kinds of light which are the cause of these beautiful reflected colors cannot pass through glass easily, better effects are obtained by concentrating the beam of light from the lamp directly on top of the water.

SOME EXPERIMENTS WITH IODINE

Pure iodine is a black, shining, crystalline substance which looks much like graphite. Since it is too concentrated and inconvenient to use in this form, druggists make a solution of it in alcohol and water, together with some potash iodide (which also contains iodine). The potash iodide is necessary mainly to make a strong solution, since neither water nor alcohol can dissolve much iodine unaided. This solution of iodine is called tincture of iodine, and should

be in every household for use in case of cuts and sprains.

HOW TO REMOVE IODINE STAINS

In applying tincture of iodine to a cut finger or a sprained ankle, some is very likely to get on fingers where it is not wanted or to stain a handkerchief or towel. The brown stains resulting are quite soap-and-water proof, and for lack of any other means are usually allowed to wear off.

If you have dabbled in photography at all, you must be well acquainted with sodium hyposulphite, or just plain "hypo," as the photographers call it. Dissolve a couple of teaspoonfuls of "hypo" in a quarter-glass of water, and pour a little of the solution into a glass of water which has been colored brown by adding a little tincture of iodine. Instantly the solution will be as white as any spring-water. Now put a drop of the tincture on your finger, let it dry, and then apply some of the hypo solution to the brown spot. It will disappear like magic. Old spots may require several applications and more rubbing to completely eradicate them.

A BLUE COLOR FROM IODINE

Iodine has the power of forming a blue color with starch, the merest trace being sufficient. Drop a little tincture of iodine, much diluted with water, in some corn-starch which has been rubbed in a spoon and heated a moment. A deep blue color will be formed—black if the iodine is too strong. The same experiment can be illustrated by adding a little of the tincture to a glass of water in which some library paste has been dissolved. With a little adjustment, a fair imitation of a glass of elderberry wine will be obtained.

A VIOLET COLOR FROM IODINE

Place some of the tincture of iodine in a thin glass, and put the glass in a warm place. The alcohol, water, and iodine will evaporate in succession; and when the alcohol and water are gone, and the iodine is coming off, the glass will them be filled with the reddish-violet fumes of iodine.

The same color can be shown in another way. Dilute some of the tincture of iodine with water until a yellow-brown color is reached, and then pour in a little carbona. On stirring the mixture a while, the brown color will leave the water, and pass into the carbona, which will be colored purple.

PROOF THAT POTASH IODIDE CONTAINS IODINE

After the alcohol, water, and iodine in the preceding experiment have all been driven off by heating, the potash iodide will be found remaining as a yellowish-white crystalline powder. Add a spoonful of water to this to dissolve it, and then some chloride of lime such as is used for disinfecting purposes. Iodine will at once be set free from the potash iodide, and will manifest itself by a yellowish-brown color.

THE GOLD DUST SNOW-STORM

To a solution of some potash iodide, obtained by evaporation of tincture of iodine, add a solution of sugar of lead in water. This is used for poultices. If you don't find some around the house, five cents' worth from the druggist will be more than enough. (Deadly poison!) A deep orange-yellow powder will be formed. Stop adding the sugar of lead when no more yellow powder comes down. Let it settle, and pour off or draw off the water solution above. Then add just enough boiling water to dissolve the yellow powder, and let the hot solution cool. As it cools, glittering golden yellow crystals of iodide of lead will separate, which give a beautiful "silky" appearance to the solution when stirred up, and make it resemble a miniature snow-storm of gold dust.

SOME SIMPLE EXPERIMENTS IN ELECTROCHEMISTRY

As a result of many experiments, the chemical elements (which include all metals) have been arranged in a list called the electrochemical series. In general, this list represents the power of an element (under proper conditions) of replacing or displacing those elements following it on the list. Usually, too, an electric current is generated in the process. In this series, zinc, iron, tin, lead, copper, silver, and gold occur in the order stated, although other metals are sandwiched in between. The further any two metals are apart on the list, the more pronounced their differences. For instance, place a penny well scoured with sand-soap under the tongue-tip, and a silver dime, also cleaned bright, on top of the tongue-tip, in such a manner that the coins can be touched to each other. The instant they touch, a pronounced metallic taste will be noted which ceases as soon as the coins no longer touch. Some people say, too, that they can see a flash of light when the coins touch if the eyes are closed, but you will have to find this out yourself. It is certain that an electric current is

generated which can easily be noticed by the tongue; and it is not impossible that the optic nerve may also be stimulated in such a way as to give a sensation of light. A piece of zinc or iron will give much stronger results than the copper penny, because these metals are much further from silver on the list.

Dissolve some blue stone (copper sulphate) crystals in a glass of water, and hang a half a dozen nails in the solution by a piece of string. In about 10 minutes remove the nails and wash them, when they will be found completely plated with copper. If a piece of zinc is similarly treated, the copper is deposited so fast that it looks like a slimy black mud. On the other hand, a piece of (pure) silver or gold will remain unaffected.

THE FIRELESS HOT-WATER BOTTLE

Procure a thin-walled glass bottle (a baby's nursing bottle will do very well) and half a pound of photographer's "hypo" (sodium hyposulphite). Fill the bottle about half full of water, place it in another vessel of water which can be heated, and bring the water in the outside vessel to boiling. As the temperature is raised, keep adding hypo-crystals to the water in the bottle until no more will dissolve. Then add just enough water to dissolve the few remaining crystals and remove the whole from the fire, plugging the mouth of the bottle with a little cotton wool. Let the bottle and contents cool undisturbed to the temperature of the room. If everything has gone well, the bottle should contain only a colorless, cold solution of "hypo," which can be shaken around inside without having anything happen. Now remove the cotton plug, and drop in a tiny crystal of "hypo." In a twinkling the liquid freezes to a mass of crystals and becomes so hot that it can scarcely be held in the hand, remaining warm for a long time. The experiment may be repeated indefinitely merely by heating and cooling, as described. Make sure that no crystals remain in the hot solution, and that no dust gets into the cold one.

The patent hot-water bottles, which only need to have the stopper loosened a bit to make them become hot, work on the above principle.

BLEACHING

Most of the coloring materials used in coloring cloth, paper, or feathers are dyes as distinguished from pigments. Pigments are employed for paints and pottery and for other purposes where the condition of manufacture, or the wear and tear of using would soon destroy or change the colors imparted by dyes. Dyes are very complicated chemically, and a slight change in the chemical make-up of one will either entirely change the color or more probably cause it to disappear altogether. Pigments, on the other hand, are fairly simple in their nature, and consequently will stand rough treatment. The great majority of dyes are notably sensitive to exposure to strong light. Paper written upon with the so-called "indelible" pencil, or typed with the carbon paper of the typewriter, will show the character much lighter after even a week in a window open to sunlight. The chemical change wrought by light may be hastened by resorting to certain chemical agents.

Burn some sulphur in a small earthenware dish placed at the bottom of a larger vessel with a close-fitting cover. Some trouble may be experienced in getting the sulphur to burn at first, but once started it will continue with a blue flame and choking gas until it goes out for lack of air. Now slip a letter with a stamp on it and a strip of newspaper under the edge of the cover for a minute or so, and then withdraw them. Neither should show any change. Moisten the stamp and newspaper strip, and return them for the same length of time. Upon examining them again you will find the newspaper strip quite unchanged, but the pattern on the stamp will scarcely be discernible, except for the cancellation mark. It is very interesting and instructive to experiment in this manner with colored pictures cut from magazines, cotton, wool, and silk remnants of different colors, and patterns, feathers, paper flowers, or other materials, and note the action of this bleaching gas from burning sulphur. Some colors will be hardly affected, while others will vanish completely. The necessity of moisture being present has been pointed out.

Another valuable decolorizing chemical can be made from chloride of lime. The chloride of lime may be conveniently placed at the bottom of a glass fruit jar with a screw cap, and the moistened material to be bleached suspended in the jar for some time. Or some chloride of lime may be rubbed to a paste with a little water, using a stick and a glass vessel, half the amount taken of soda added, and more water, and the whole mixture filtered through several thicknesses of muslin. This solution is very powerful, and if a handkerchief stained with a few drops of red ink is immersed in it, the red spots will vanish almost instantly.

Finally, the third of the common bleaching

chemicals is peroxide, that is, hydrogen peroxide. Its action is much milder than that of the other two chemicals previously described, but it is less injurious to the material treated, not being of an acid nature. It is slower, however, and its practical application, therefore, is limited.

Dilute some hydrogen peroxide with about five times as much water, place in a bottle, add a little ammonia, and then some black hair, or, better, a black wing feather from a chicken. Shake the bottle occasionally, and renew the solution about once a day. The color will gradually lighten, and in the end generally becomes some shade of yellow.

From the painting by Edwin H. Blashfield which hangs in the trophy room of the Mercersburg Academy, Mercersburg, Penna.

SIMPLE APPLIED ELECTRICITY

BY ALFRED P. MORGAN

EXPERIMENTS WITH STATIC ELECTRICITY

SEVERAL thousand years ago the ancient Syrian women used distaffs made of amber for spinning. As the distaff was whirled around, it sometimes touched the spinner's garments and the friction caused it to become *electrified,* as amber does when it is rubbed. As soon as the distaff became electrified, it possessed a new and mysterious power, and drew to itself bits of thread and dust which would become entangled in the skein, unless they were removed. The amber distaff was, therefore, called the *harpaga,* or "clutcher," because it seemingly seized and held on to light bodies and dust particles.

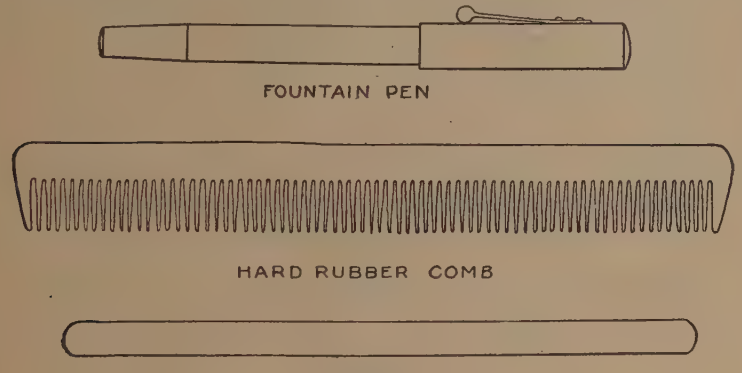


FIGURE 1

This was probably the first time that any intelligent observation of an electrical effect was made. It was not until many centuries afterward that it was discovered that amber always became charged with electricity or electrified when rubbed or subjected to friction. It is from this curious property of amber that we get our word *electricity,* for the Greek word *"elektron"* means amber.

Many other substances (see Figure 1) besides amber will produce electricity when they are rubbed. A glass rod or a piece of hard rubber, such as a fountain pen or hair comb, rubbed briskly with a piece of flannel or silk, will thus become electrified or charged with *static* electricity.

There are two classes of electricity: one named *static* electricity; the other, *current* electricity. Static electricity is usually produced by friction, while the other is generated by batteries or dynamos.

Experiments with static electricity are more easily performed in the wintertime, when it is cold and dry, than in the summer, when the air is warm and damp.

You can easily electrify a hard-rubber fountain pen by rubbing it briskly with a piece of warm, dry flannel. Then hold the pen over some small bits of paper and watch them jump up to meet it. If you observe very closely, you may notice that some of the little pieces of paper not only jump up to the fountain pen, but, as soon as they touch it, fly quickly away again. (See Figure 2.)

You can observe this somewhat more easily by varying your experiment slightly. Instead of bits of paper use small pieces of charcoal. A burnt

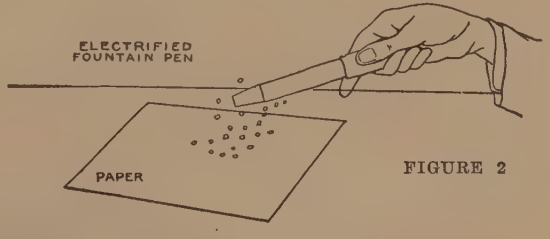


FIGURE 2

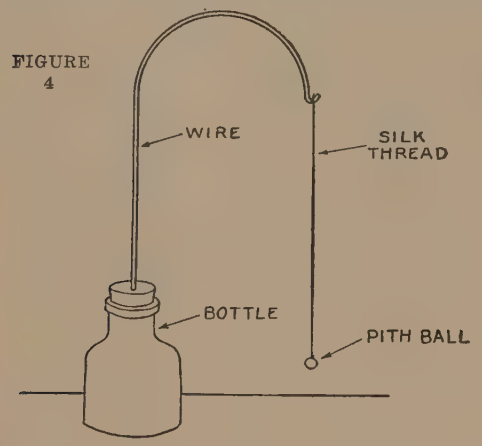
FIGURE 3

match broken into very small fragments will supply the charcoal. Place the pieces of charcoal on the top of a tin baking-powder can and hold the electrified fountain pen over them. They will jump up to meet the pen, but, as soon as they touch it, they will fly off again as though violently repelled, and, indeed, they are violently repelled. (See Figure 3.) The reason for it is this:

Similarly charged bodies repel each other.

Before the bits of carbon jump up to meet the pen they carry no charge. Once they touch the pen, however, they become charged with the same kind of electricity with which the pen is charged, and so are no longer attracted, but pushed away.

The presence of static electricity is usually detected by means of an *electroscope*. There are several kinds of electroscopes, and some of them are so sensitive that they will respond to an almost unbelievably small amount of electricity. One of the simplest forms of electroscope which the young



experimenter can build is that shown in Figure 4, and is called a pith-ball electroscope. It consists of a tiny ball of cork or elder pith hung by a fine silk thread from a bent wire set into the cork in the top of a bottle.

If an electrified fountain pen or comb is presented to the pith ball, the ball will be attracted. (See Figure 5.) If the electrified rod is permitted to touch the pith ball, it will transfer some of its electricity to the latter, and the ball will immediately fly away from the rod and will refuse to be attracted again until it is first touched with your finger, so as to disperse the charge.

The amount of electricity generated by rubbing a glass rod or fountain pen with a piece of flannel is extremely small. You can obtain a much larger amount of static electricity by means of an instrument called the *electrophorus,* devised one hundred and fifty years ago by Alessandro Volta, an Italian professor in the University of Pavia. An electrophorus is easily constructed, and will furnish a source of sufficient static electricity to make sparks, etc. It consists of two parts, a round cake of resin and a metal disk which is fitted with an insulated handle.

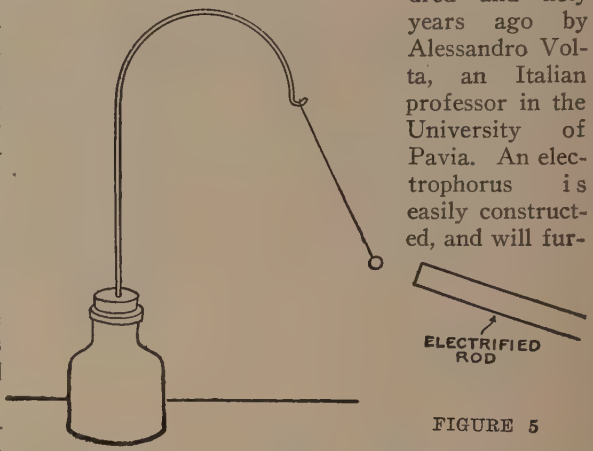


FIGURE 5

In order to make an electrophorus, you will require an old cake or pie tin. Fill the tin with resin or sealing wax and put it in a warm spot on the stove, where it will melt slowly. Put enough of the resin or sealing wax (whichever you may use, but do not use both) in the pan so that the pan is almost full when the resin or wax is all melted. Then remove the pan from the fire and set it away where the contents may cool and harden without being disturbed. Be very careful when melting the wax and resin that the mixture does not take fire.

Make a circular disk out of sheet tin, zinc, or brass, slightly larger in diameter than one-half the diameter of the pie tin. Solder a small cylinder of tin or sheet brass to the center of the disk. Set a piece of glass rod or tubing in the cylinder and cement it firmly in place with some sealing wax so that the glass forms an insulated handle attached to the disk or cover. (See Figures 6 and 7.)

In order to operate the electrophorus (it will only operate properly in cold weather), warm the resin cake slightly and then rub it briskly with a piece of warm flannel or a piece of fur. Place the disk or cover in the center of the cake and hold the insulated handle in the right hand. Then touch the disk for an instant with one of the fingers of the left hand. After the finger is

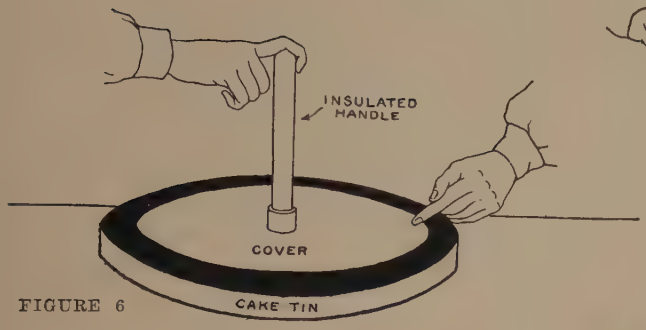


FIGURE 6

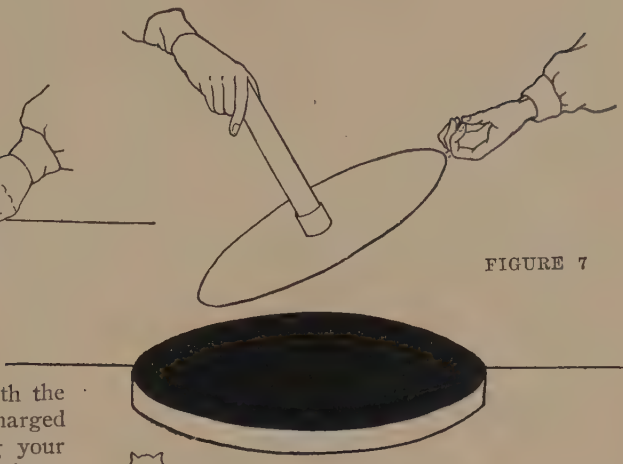


FIGURE 7

removed, raise the disk by picking it up with the glass handle. The disk is now heavily charged with positive electricity, and, if you bring your knuckles near, a bright, snappy spark will jump out to meet them. The disk may then be placed on the resin, touched, and lifted off, highly charged, an innumerable number of times. It will only be necessary to rub the resin occasionally in order to keep the electrophorus working.

"The Jumping Cats" may be experimented with by cutting out some very small toy cats from thin paper. Dampen them very slightly and lay them on the electrophorus disk. Touch the disk with the finger before lifting it up, and then raise it in the usual manner by means of the insulating handle. If the paper cats are not too damp, they will all jump off the cover as soon as it is raised. (See Figure 8.)

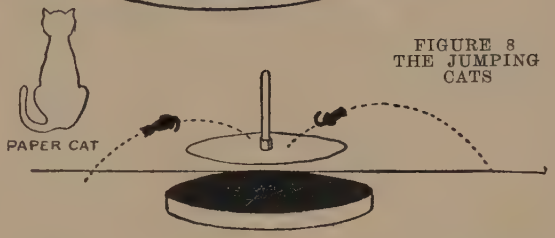


FIGURE 8
THE JUMPING CATS

THE GENERAL ELEMENTARY PRINCIPLES OF ELECTRICITY

The First Electric Battery

In 1799 Count Volta, the physicist of electrophorus fame, discovered the first practical battery cell for generating electricity by means of chemicals. This device is called the *voltaic* cell, after its famous inventor.

It is easy to make a voltaic cell by placing some water, with which a little sulphuric acid has been mixed, in a glass tumbler or jelly jar and immersing therein two metal strips, one of copper and the other of zinc. The strips should be kept separated from each other by placing them on opposite sides of the jar. Each strip should be long enough so that it projects above the edge of the jar, and it should have a copper wire soldered to the top. (See Figure 9.) The zinc and copper strips are called the elements of the cell, while the mixture of sulphuric acid and water is called the *electrolyte*.

As soon as the elements are immersed in the electrolyte, bubbles commence to rise from the zinc. These bubbles are *hydrogen* gas and are the first evidence that something is happening in the cell. A *chemical action* is taking place and the zinc is being dissolved by the acid, setting free the hydrogen gas during the process. If the zinc remains in the acid solution long enough, it will entirely disappear.

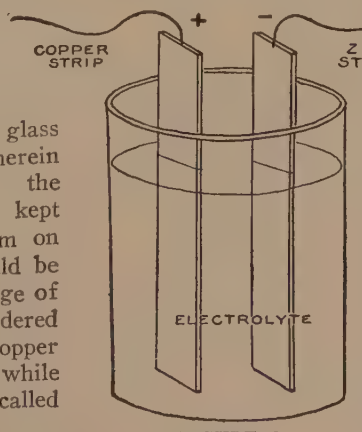


FIGURE 9

Voltaic cells, and all of the other improved forms of cells depending upon the same principle, are called *primary* cells, in order to distinguish them from *secondary,* or storage cells. We will learn

more about storage cells later. All primary cells consist of two different elements, not always copper and zinc, and some sort of an electrolyte. And in all of them, one of the elements is attacked and dissolved by the chemical action of the electrolyte. However, there is something, besides a mere chemical action which dissolves the zinc, taking place, because, if the two wires connected to the strips are brought together, the bubbles will arise from the zinc much faster than before. That is because, when the wires are connected together, a complete electrical circuit is formed. The zinc element is being slowly *oxidized,* or burned, in the acid solution. If zinc is burned in the open air or in a fire, it will give out its energy in the form of heat, but when it is "burned" in the acid solution in the presence of a copper strip, part of the energy given out is *electricity.*

When the two wires connected to the elements are connected together, *an electric current flows* through the circuit. The wires now have some very interesting properties which they did not possess before, and, if you become acquainted with these wires while they are carrying an electrical current, you will understand the elementary principles of electricity.

Whenever we wish to find the answer to something which we do not know, there are two ways of proceeding. One way is to search for the answer in the proper book, or else ask someone who does know. The other is to arrange an experiment and then, by using our eyes, together with the "eye of the mind," or our reasoning power, answer the question ourselves. An experiment is a question asked of Nature, and Nature is always willing to answer our questions, provided that we ask them properly and then use our eyes and reasoning correctly. There are a number of simple and interesting experiments which will answer all of the questions which we might like to have answered about wires when they are carrying an electrical current.

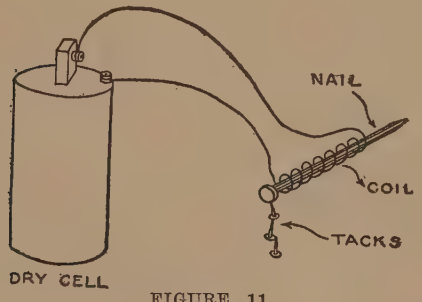


FIGURE 11

A voltaic cell is not a very convenient means of supplying the electric current for these experiments, because the acid solution is apt to attack or corrode anything upon which it might accidentally be spilled or splashed. It will, therefore, be best to secure one or two good dry cells of the type commonly used for ringing doorbells, etc.

How a Wire May Become a Magnet

Connect two copper wires to one of these dry cells and stretch a portion of the wire close to a pocket compass, holding the wire parallel to the needle and as close as possible. Then bring the free ends of the wires together; notice that the compass needle moves every time that you touch the wires.

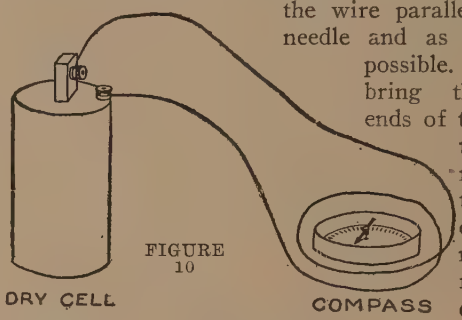


FIGURE 10

The Electromagnet

The majority of electrical instruments and devices depend for their operation upon the fact that a wire carrying a current has these magnetic properties which our experiments have shown. Advantage has been taken of this to devise the *electromagnet.* An electromagnet is an iron bar wrapped with many turns of insulated wire. When a current of electricity passes through the coil, the iron bar becomes a powerful magnet. As soon as the current stops, the bar ceases to be a magnet.

You can make a simple electromagnet by winding a few turns of insulated wire around an iron nail. Connect the ends of the wire to a battery, and the nail will become a magnet with sufficient strength to pick up other small nails, tacks, etc. (See Figure 11.)

AN INTERESTING EXPERIMENT WITH ELECTRICITY

The Electrolysis of Water (Figure 12)

WHENEVER you drink a glass of water, you have swallowed something that is probably older than anything else on earth. It existed before there was any living plant or creature on this world. And, in spite of the fact that water is a heavy liquid substance which we can easily feel and see, it is in reality composed of two invisible *gases* called *oxygen* and *hydrogen*. If an electric current is caused to flow through water under proper circumstances, the force by which these component gases are held together will be overcome. You can perform this as an experiment yourself.

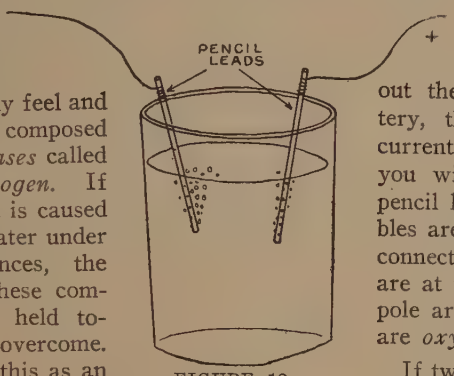


FIGURE 12

Fill a glass tumbler with water containing a little sulphuric acid. Then obtain two pieces of soft pencil lead or small carbon rods and two short pieces of copper wire. You will also require a battery capable of delivering from three to six volts. Twist a piece of the bare copper wire around each of the pencil leads so as to make a good electrical connection. Connect the other end of each wire to the terminals of the battery. Place the two leads in the acid solution. It is important to keep the copper wires out of the solution, only the lower ends of the leads being immersed.

The electric current from the battery flows down one wire through the pencil lead, across the solution, and out the other lead and wire back to the battery, thus completing the circuit. When the current is started flowing through the solution, you will notice tiny bubbles collecting on the pencil leads and rising to the surface. The bubbles are generated much more rapidly at the lead connected to the negative of the battery than they are at the positive. The bubbles at the negative pole are *hydrogen* gas, and those at the positive are *oxygen*.

If two test tubes are filled with acidulated water and inverted over the leads so that the rising bubbles enter the mouths of the tubes, the gas can be collected, and it will be noticed that there is soon twice as much hydrogen as oxygen. If you continue to pass a current through the solution, all of the water will gradually be decomposed into two gases until there is nothing but a little sulphuric acid left in the bottom of the tumbler. This process of decomposing water by means of electricity is called *electrolysis*.

ELECTRIC BELLS AND BUZZERS

EVERY modern house is nowadays provided with an electric doorbell. Like every other mechanical or electrical contrivance a bell often gets out of working order and fails to operate. Only in very few cases should it be necessary to call in the services of an electrician, as electric bell and the wiring system for operating it are really very simple.

Figure 13 is a diagram which will illustrate the principle of the electric bell. Two electromagnets M M are arranged in front of an iron armature I, so that when a current of electricity is sent through the electromagnets the armature is drawn toward them. The armature is provided with a hammer or tapper T for striking the gong G. The armature is, however, also provided with a spring which tends to pull it away from the magnets. A small contact point B, mounted on the armature, makes contact with a fixed point A. These contact points are placed in series with the electromagnets, so that as soon as the armature is attracted the circuit is broken and the current ceases to flow, the electromagnets no longer attract the armature, and so the latter is pulled back again by the spring until the contacts A and B touch again and complete the circuit once more, the armature being drawn forward by the magnets. Thus the armature is kept swinging back and forth, causing the little hammer to tap against the gong.

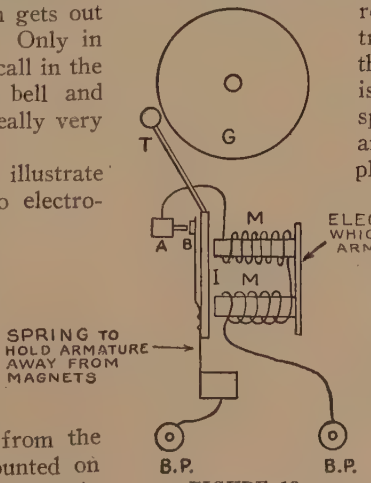


FIGURE 13

Figure 14 shows the common form of electric bell, with the "box," or cover, which protects the magnets removed.

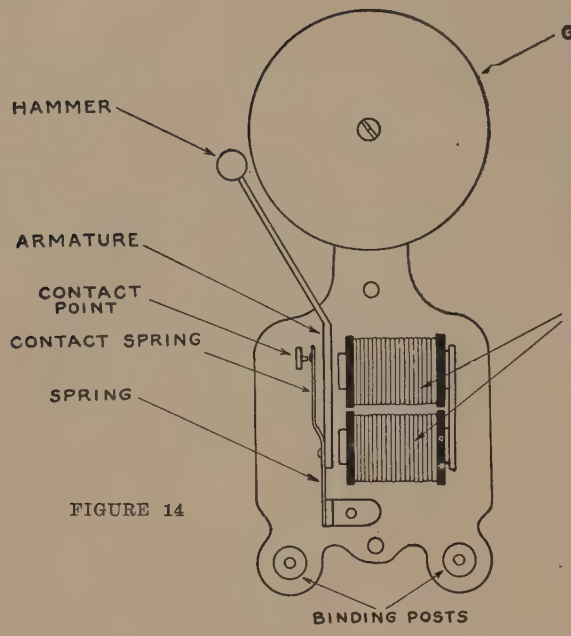


FIGURE 14

When an electric bell fails to operate, the most common reason for its failure is an exhausted battery.

Doorbell circuits formerly made use of what is known as a carbon cylinder cell, illustrated in Figure 15. This consists of a carbon cylinder

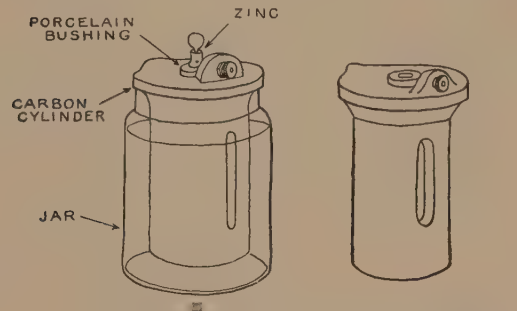


FIGURE 15

inserted in a glass jar containing a solution of sal ammoniac in water. A zinc rod hangs in a porcelain bushing in the center of the carbon. Many of this type of cell are still in use.

When the cell is exhausted, the sal ammoniac solution and the zinc rod need renewing. Wash the carbon cylinder and the jar thoroughly with fresh water, and then fill the jar nearly full of clean water. Dissolve one "charge," generally four ounces of sal ammoniac, in this water, slip a new zinc rod through the bushing in the carbon cylinder, place the latter back in the jar, and the cell is ready to operate again. You can purchase a new zinc rod and a small box of sal ammoniac containing the "charge" for one cell at any electrical supply store.

Be certain that the ends of the wires and the binding posts are scraped clean and bright and firmly tightened after connection is made.

Dry cells are a far more satisfactory source of current for an electric bell system than the carbon cylinder cell just described, and it will pay to replace the latter with more up-to-date current supply. Figure 16 shows the simplest possible circuit of a single dry cell, an electric bell, and a push button. When the push button is pressed, the circuit is closed so that the current from the dry cell rings the bell.

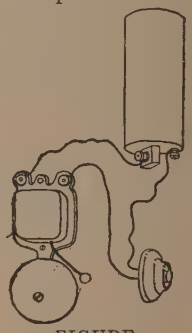


FIGURE 16

It is hardly practical to use only one dry cell on a bell system, and it is advisable to use two cells, unless the line is a very long one. In the latter case a battery composed of more than two cells will be necessary. The cells should be connected in series, as shown in Figure 17. Also, it may sometimes be desirable to provide two push buttons at different points, either one of which may be used to ring the same bell. In that case they should be arranged according to the circuit diagram shown in Figure 18.

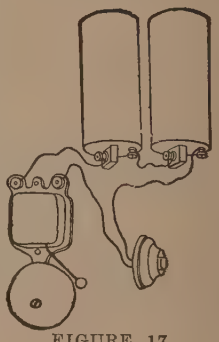


FIGURE 17

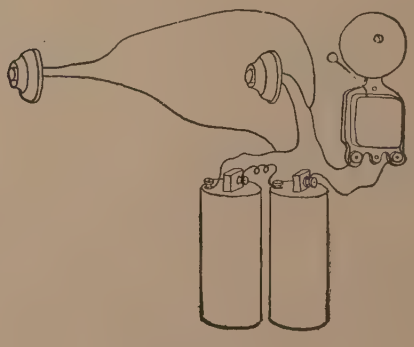
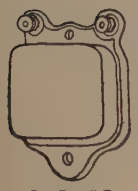


FIGURE 18



BUZZER
FIG. 19

A buzzer is simply an electric bell without any gong or tapper. A buzzer is used where the noise of a bell would be objectionable, or where it is desirable to make a distinction from the sound of a bell. (See Figure 19.)

A "floor push" (Figure 20) is to be seen in the dining-rooms of many houses, and a connected buzzer in the kitchen makes it possible to call the maid during meals. This circuit may be operated by the same battery which supplies current to the electric doorbell, as shown by the circuit in Figure 21.

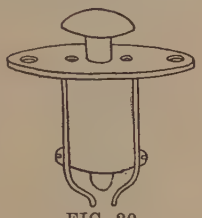


FIG. 20

There are many reasons why an electric bell or a buzzer may fail to operate. It is impossible, on account of lack of space, to go into the details necessary in order to explain just how each of the possible troubles may be located and remedied, but some of the suggestions outlined below should enable the young electrician to locate and overcome the difficulty without much trouble.

1. Exhausted battery
2. Insufficient battery
3. Cells not properly connected in series
4. Poor connections to battery terminals
5. A broken wire in the circuit
6. Dirty or corroded contact points in the push button
7. Imperfect connection of the wires to the push button
8. Dirty contacts on bell or buzzer
9. Armature spring bent
10. Armature jammed or stuck
11. Imperfect connection to binding posts
12. Bell tapper touching gong
13. Short circuit in the wiring system

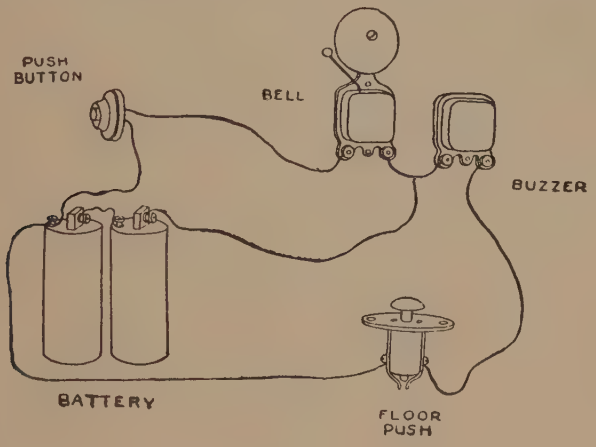
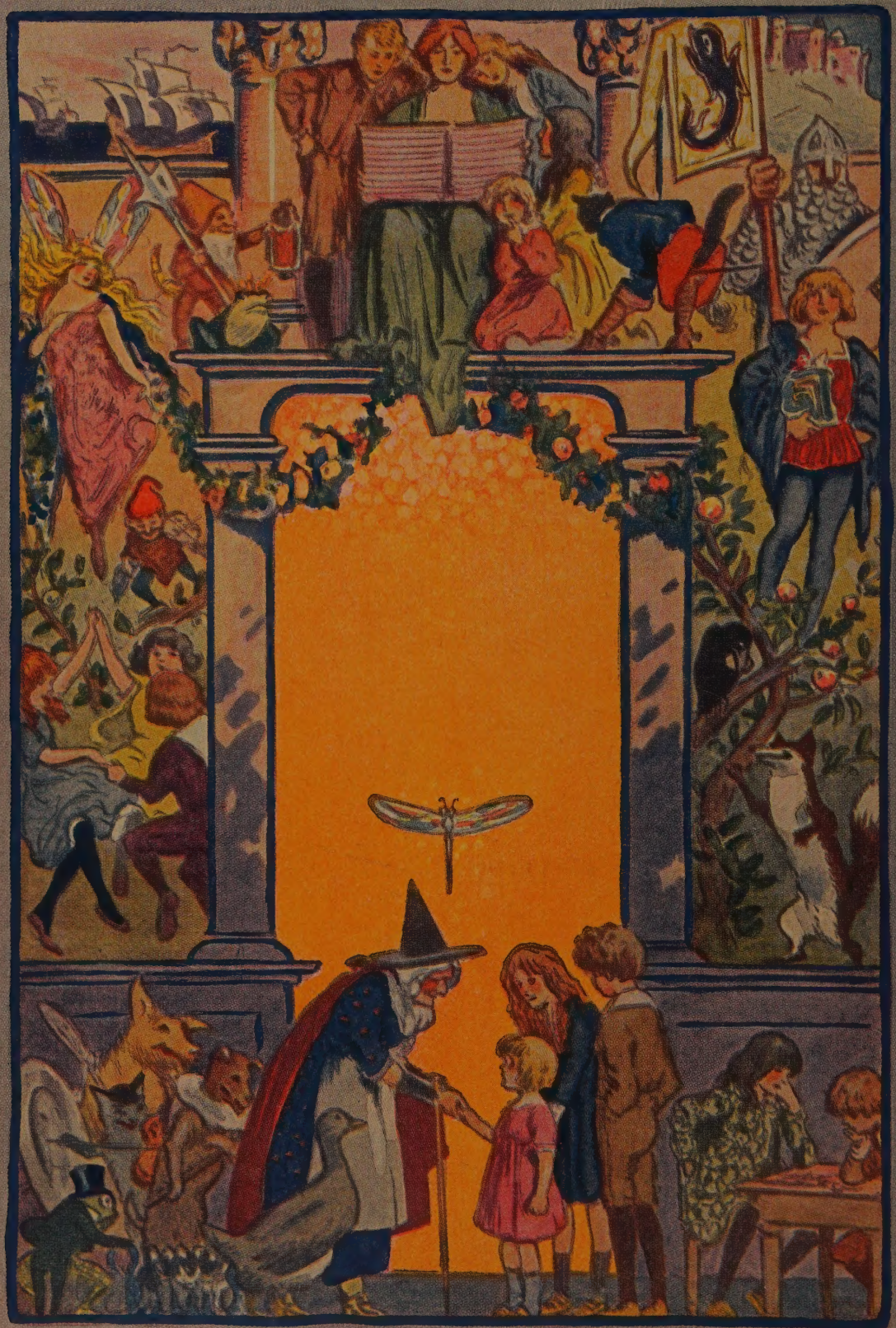


FIGURE 21



SCIENCE
ART